INSTRUCTION MANUAL

for

THE NATIONAL MODEL NC-125

RADIO RECEIVER

A truly versatile Receiver in a compact, modern package at an attractive low price . . .

National

NC

EST. 1914

PRICE 50 CENTS

National

NC-125 RECEIVER

HIGHLIGHTS . . .

- Continuous Frequency Coverage of from 560 kilocycles to 35 megacycles.
- Direct Frequency Reading Slide-Rule Dial
- Calibrated Bandspread Tuning for 10-11, 15, 20, 40 and 80 Meter Amateur Bands
- Automatic Noise Limiter
- Built-In Select-O-Ject
- Accessory Connector Socket
- Stabilized Voltage Regulated Circuits
- R.F. Amplifier Stage with Panel Trimmer
- Two I.F. Amplifier Stages
- Separate Loudspeaker in Matching Cabinet

National Company, Inc.

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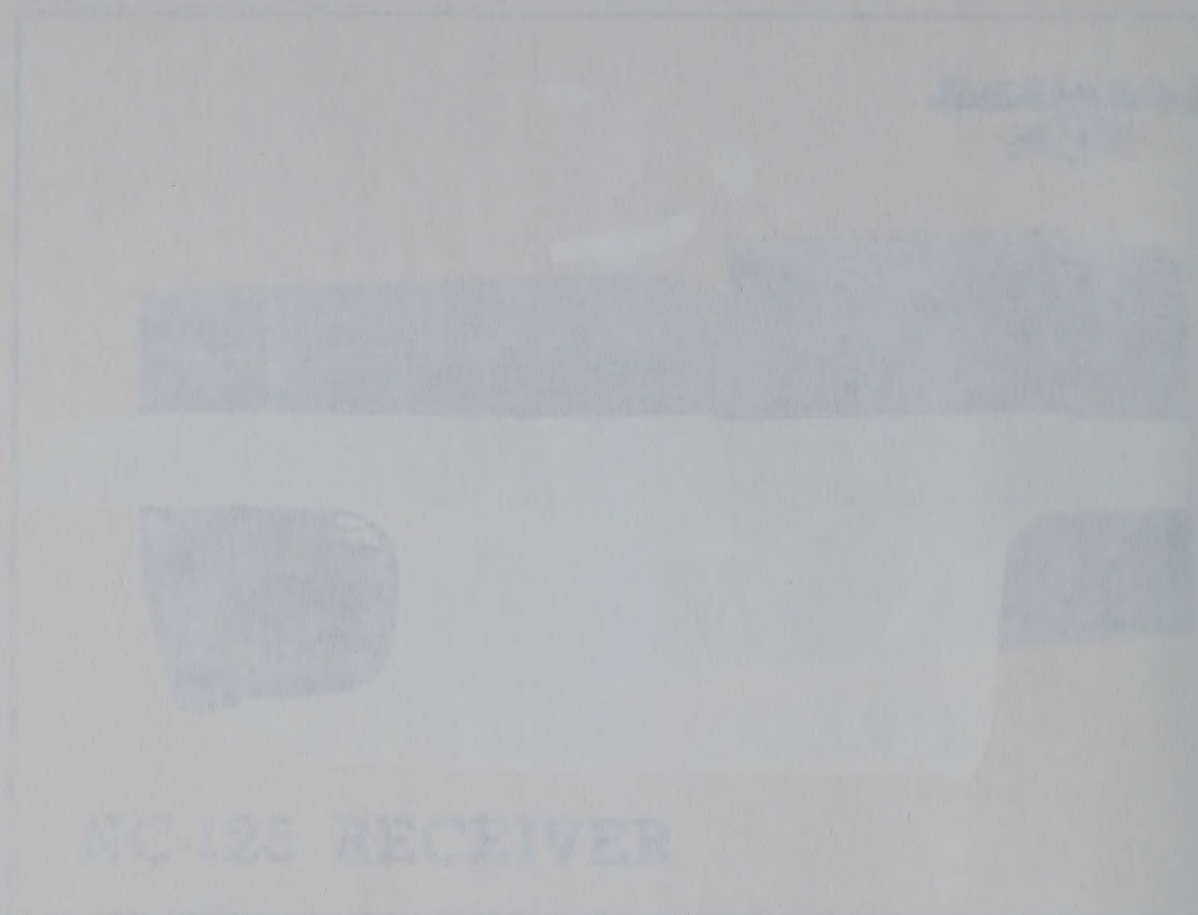
NC-125 RECEIVER

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NC-125

RADIO RECEIVER

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SECTION I. DESCRIPTION

1-1. GENERAL

The NC-125 is a superheterodyne Radio Receiver having a complement of eleven tubes, including a rectifer and a voltage regulator tube, with a continuous frequency coverage of from 560 kilocycles to 35 megacycles. This Receiver is designed for the reception of amplitude modulated voice or music and code telegraph signals throughout its entire frequency range. A calibrated illuminated slide-rule dial provides direct reading scales in megacycles for each of the General Coverage ranges as well as additional calibrated bandspread scales for the 10, 11, 15, 20, 40 and 80 meter amateur bands. The selectivity characteristic is adjustable over a wide range from broad-band broadcast requirements to sharp amateur C.W. reception. This is accomplished by incorporating the well known Select-O-Ject variable audio frequency device in the Receiver circuit design. The adjustable selectivity plus high sensitivity assures the operator of optimum reception during adverse operating conditions.

The NC-125 employs a voltage regulator tube to minimize frequency drift in the high-frequency and beat-frequency oscillators. This assures a minimum of frequency drift for both phone and code reception. Other highlights include an accessory connector socket, separate loudspeaker in matching cabinet and a front-panel mounted S-meter. The separate bandspread control knob and linear logging dial scale makes possible fine, vernier-type tuning for any portion of the frequency spectrum covered by the Receiver. The usefulness of this feature will be outstanding on crowded bands such as the foreign broadcast band etc.

1-2. CIRCUIT

The stage outline of the circuit employed in the Receiver is given below together with the tube associated with each stage.

R.F. Amplifier	6SG7
High-Frequency Osc-Mixer	6SB7-Y
First I.F. Amplifier	6SG7
Second I.F. Amplifier	6SG7
Second Det.-A.V.C.-A.N.L.	6H6
Phase Shifter	6SL7GT
Boost-Reject Audio Amplifier	6SL7GT
First Audio Amplifier - C.W.O.	6SL7GT
Audio Output	6V6GT
Voltage Regulator	0A2
Rectifier	5Y3GT

1-3. TUNING SYSTEM

The three-gang main tuning capacitor, the panel-mounted Trimmer control and four set of coils are used to properly tune the frequency range of the Receiver in four General Coverage tuning bands as shown on the following table. The main tuning capacitor and the bandspread capacitor are connected in parallel on all bands. A slide-rule type dial with two separate pointers is utilized. One of these pointers is synchronized with the main tuning control and the other with the bandspread control. The General Coverage portion of the slide-rule dial has four scales accurately calibrated for direct reading in megacycles as follows:

BAND	FREQUENCY COVERAGE
A	12.0 - 35.0 Mc.
B	4.4 - 12.0 Mc.
C	1.55- 4.4 Mc.
D	0.56- 1.55 Mc.

It will be noted that Band D encompasses the entire Standard Broadcast Band. The respective scales are marked with heavy white scorings to clearly locate for the operator such short-wave features as the Amateur, Police, Ship Frequencies and Foreign Broadcast bands.. These locating markers are identified by letters AM, P, S and F, respectively.

The Amateur bands tuneable by the NC-125 are listed below with their band locations. Five accurately calibrated Bandspread scales are provided on the slide-rule dial for each of the specified Amateur bands.

BAND	AMATEUR BAND	FREQUENCY
A	10, 11	27.16 - 29.7 Mc.
A	15	21.0 - 21.5 Mc.
A	20	14.0 - 14.4 Mc.
B	40	7.0 - 7.3 Mc.
C	80	3.5 - 4.0 Mc.

1-4. AUDIO OUTPUT

Two audio output circuits are provided as follows:

(1) The Loudspeaker supplied with the NC-125 is of the permanent magnet field type and is mounted in a cabinet finished to match the Receiver. An output terminal strip is mounted at the rear of the Receiver for convenient connection of the Loudspeaker.

(2) A Phones jack is mounted on the front panel and is wired so as to silence the loudspeaker when headphones are used. The headphones load impedance is not critical permitting a wide range of headphones types, including crystal, to be used.

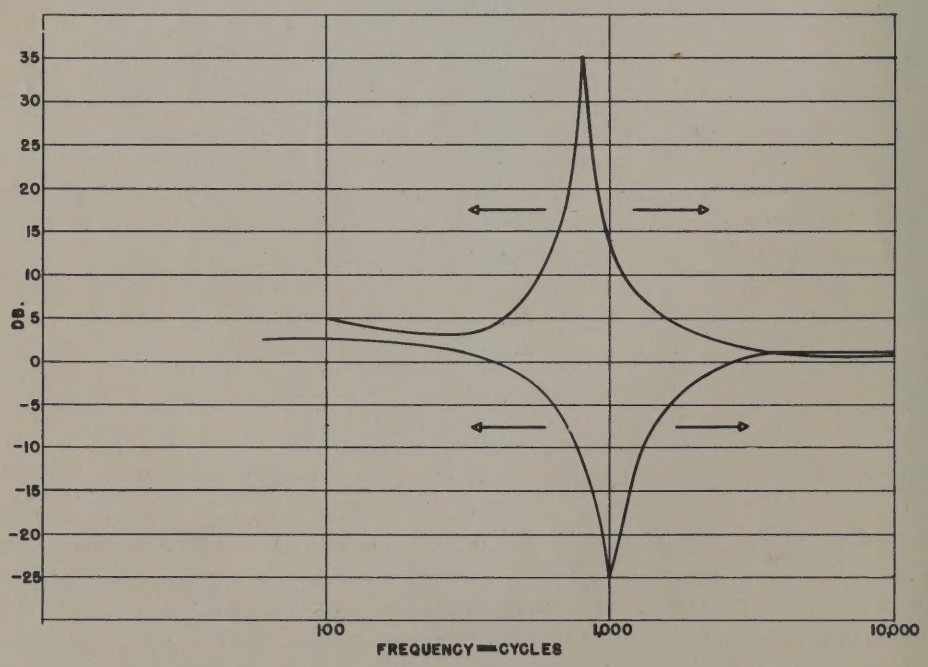


Figure No. 1. Select-O-Ject Circuit Characteristic

1-5. SELECT-O-JECT

The NC-125 Receiver incorporates a built-in Select-O-Ject audio frequency circuit. By proper adjustment of the front-panel mounted controls associated with this circuit any single frequency selected in the range of approximately 80 to 10,000 cycles may be boosted or rejected. Its

capabilities are graphically illustrated on Figure No. 1. In phone reception the Select-O-Ject may be used for the rejection of interfering heterodynes. In C.W. reception interfering signals may be rejected or, alternatively, the desired signal may be selected and amplified. In the reception or amplification of music, the Select-O-Ject may be used as an adjustable bass boost.

1-6. SIGNAL STRENGTH METER

Signal input readings are indicated in S-units from 1 to 9 in 5 db. steps and in db. above S-9 from 0 db. to 40 db. on the panel-mounted signal strength meter. The S-Meter employs a 0-1 milliampere movement and is connected in a bridge circuit. A variable resistor is placed in series with the meter to allow adjustment of the pointer to its electrical zero setting. The correct dial setting for any specific station on the dial is that setting which provides maximum deflection of the meter pointer.

1-7. POWER SUPPLY

The NC-125 Receiver is designed for operation from a 105/130 volt, 50/60 cps., A.C. source of supply. Normal power consumption is approximately 91 watts. The built-in power supply provides all voltages required by the heater and B supply circuits 2.85 amperes at 6.3 volts and 92 milliamperes at 250 volts, respectively.

The NC-125 is readily adaptable to battery operation and instructions for using batteries are given in detail in Section 2.

1-8. PHONO INPUT

A Phono input jack is mounted on the front panel and can be used to connect auxiliary apparatus, such as a record player pick-up or microphone into the audio system of the Receiver. This input circuit is of high impedance providing a suitable match for such external equipment into the first audio amplifier stage.

Most record players are terminated in a single shielded wire. As the Phono input jack on the Receiver is designed to accommodate a standard phone plug, it is necessary that this single shielded wire be attached to a phone plug. If the output circuit of the record player is of low impedance (less than 100,000 ohms) improved efficiency will be obtained if a suitable resistor with a value as specified for the particular record player, is connected across the phone plug to properly load the record player output circuit.

When a record player is used in conjunction with the Receiver the R.F. Gain control should be set at the extreme counterclockwise position. Both the A.F. Gain and Tone controls are operative with this type of operation.

1-9. ACCESSORY CONNECTOR SOCKET

A standard octal type socket is mounted at the rear of the Receiver to permit convenient connection of a narrow-band F.M. adaptor. Reception of narrow-band F.M. signals may be accomplished by plugging a National Model NFM-73B directly into the Accessory Socket and inserting the phone plug supplied with the unit into the Phono jack at the front of the Receiver. The drawing of the Accessory Connector Socket on the Schematic Diagram shows the various connections made to the pins of the socket and the voltages available. As will be noted B+ and filament voltages as well as I.F. output are available at this socket permitting the connection of auxiliary equipment. Consideration must be exercised to prevent loading any of these supplies beyond that for which they are designed.

SECTION 2. INSTALLATION

2-1. INSTALLATION PROCEDURE

Carefully unpack the Receiver from its packing crate and proceed as follows:

(1) Make sure A.C. jumper plug, P-1 (at rear of Receiver) and all tubes are seated firmly in their sockets

(2) Connect a good external ground to the terminal labeled G on the antenna strip at the rear of the Receiver. This connection is not absolutely required but in certain localities considerable reduction in interfering noise can be achieved by such a connection.

(3) Connect the antenna as recommended in Section 2-3.

(4) Connect the power cord, P-2, to a 105/130 volt, 50/60 cycle, A.C. source of supply.

(5) Set controls as recommended in Section 3 for the reception of signals.

NOTE

Where the Receiver is located in the field of a transmitting station, as would be the case when the NC-125 is used as the Receiver in a transmitting station, it is advisable to provide some means of preventing damage to the receiver antenna coil. If a separate receiving antenna is used, a means for disconnecting the antenna from the Receiver or grounding the antenna during transmission periods should be provided.

2-2. ARRANGEMENT

The Receiver and the Loudspeaker may be arranged in any desired position although it is not recommended that the Loudspeaker be placed on top of the Receiver as undesirable microphonics may result. Wherever practicable placement of the Receiver should be made to allow freedom of air circulation on all four sides.

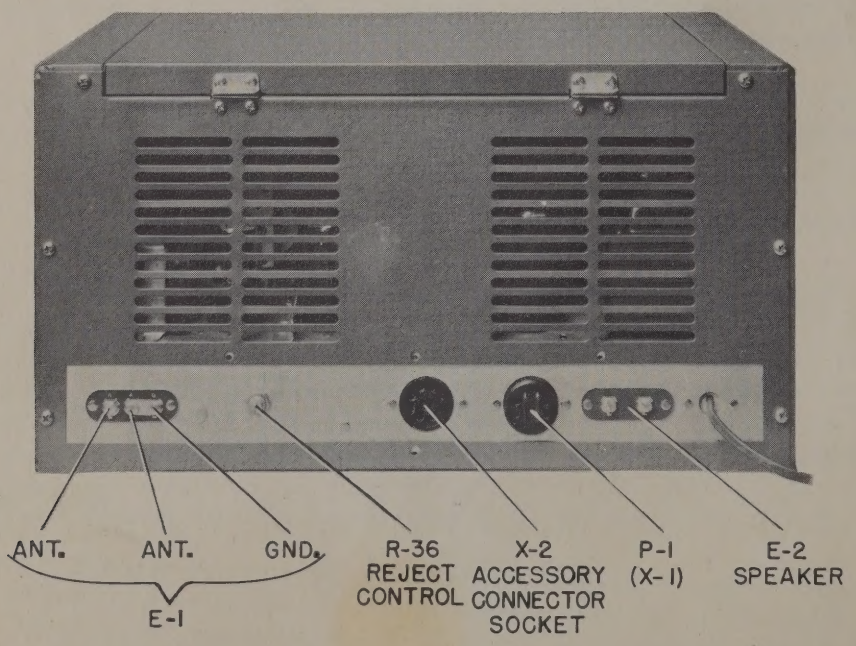


Figure No. 2. Rear View of Receiver

2-3. BATTERY OPERATION

The NC-125 Receiver is readily adaptable to portable or emergency service by connecting batteries to the terminals of the power socket, X-1, at the rear of the Receiver. The A.C. jumper plug, P-1, may be rewired for battery connection or if changeover operation is desired another octal plug should be obtained. Do not use the A.C. jumper plug, P-1, for battery operation without first removing the jumper wires. The battery plug used should be wired in accordance with the drawing shown on the schematic diagram. The voltage regulator tube should be removed during battery operation. A 6-volt heater supply (storage battery) should be connected to terminals 3 and 5 and 180 to 250 volt "B" supply connected to terminals 1 and 8. Current drain is approximately 72 milliamperes and 2.85 amperes at 180 and 6 volts, respectively. A suggested refinement is to include a switch in the A+ lead so that the tube heaters may be turned off when the Receiver is not in use without the necessity of removing the battery plug. The Standby-Receive switch on the Receiver is operative with battery operation the same as for A.C. operation. The A.C. line switch on the front panel does not render the Receiver inoperative during battery operation.

The recommendations of Section 3, Operation, apply to the battery powered NC-125.

2-4. ANTENNA RECOMMENDATIONS

The antenna input circuit of the Receiver is arranged for operation from either a single-wire type, doublet type antenna or other types having impedances of 70 ohms or more. The input impedance of the antenna circuit is approximately 300 ohms

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of 50 to 100 feet is recommended although the length is not critical and any length between 25 and 200 feet may be used. In installations where the Receiver is tuned to one frequency or a narrow-band of frequencies optimum results will be obtained by designing the antenna for the operating frequency. In an installation where the Receiver is to be used as the receiving unit in a transmitting station the most efficient operation will usually result from use of the transmitting antenna as a receiving antenna also. For switching the antenna from transmitter to receiver, an antenna changeover relay with good high frequency insulation is recommended.

The method of connecting the various types of antennae to the antenna terminal strip at the rear of the Receiver is as follows:

(1) Single-wire type -- Connect antenna to terminal A at the left of the strip and ground the unused A terminal by means of the metal link.

(2) Doublet type -- Connect the antenna feeders to the two terminals marked A; the metal link is not used.

(3) Concentric transmission line type -- Connect the inner conductor to terminal A at the left of the strip and the outer conductor to the other A terminal which, in turn, should be connected to the metal link.

SECTION 3. OPERATION

3-1. CONTROLS

This section on controls is presented prior to the actual operating instructions to give the operator of an NC-125 an understanding of the function of each control on the Receiver. All controls are clearly identified by front panel markings.

The R.F. Gain control adjusts the sensitivity (ability to receive weak and distant stations) of

the Receiver from a minimum at the extreme counterclockwise position of the knob to a maximum at the extreme clockwise position. This is accomplished by adjustment of the amplification of the R.F. and I.F. amplifier stages.

The Band switch has four positions and serves to select the band of frequencies to be tuned by the Receiver. The four positions are marked with identifying band designations which correspond to the markings which appear on the General Coverage portion of the slide-rule dial.

The Trimmer control operates a tuning capacitor trimmer which is connected across the first R.F. amplifier main tuning capacitor section. The trimmer control is used to tune the R.F. amplifier stage properly under a wide variety of antenna loading conditions.

The A.F. Gain - A.C. OFF control is a dual purpose type. In the A.C. OFF position the Receiver is turned off; when the control knob is turned clockwise the A.C. line switch is closed, thus turning on the Receiver. The other function of this control is to adjust the audio output volume of the Receiver. Audio volume is progressively increased to a maximum when the knob is turned to the extreme clockwise position.

The Control switch labeled C.W.O., M.V.C., A.V.C. and A.N.L. has four functions corresponding to the switch markings. In the A.V.C. position the automatic volume control circuit is switched into the circuit to compensate for fluctuating volume due to fading. In the A.N.L. position the automatic noise limiter is switched on to effectively reduce interference caused by static, automobile ignition noise etc. Limiting action automatically takes place at a relatively high percentage modulation. The automatic volume control circuit remains operative in the A.N.L. position of the control switch. The M.V.C. position disables the A.V.C., C.W.O. and A.N.L. circuits. The C.W.O. positions switches into the circuit the C.W. oscillator to permit reception of code telegraph signals.

The Pitch control is used in conjunction with the C.W.O. position of the control switch and has no effect on receiver performance with any other control switch setting. The Pitch control is used to adjust the beat note of the incoming code signal to an audio tone pleasing to the operator. The C.W. oscillator is tuned to the Receiver's intermediate frequency mid-scale on the control knob. The range of the Pitch control is approximately ±3,000 cycles.

The Tone switch is utilized as a combination Select-O-Ject and Tone control switch. In the Boost position the front-panel mounted Boost control is operative. As the boost control is advanced in a clockwise direction the circuit becomes more regenerative finally breaking into oscillation. For maximum boost of an incoming audio frequency, the Boost control should be set as closé as possible to the oscillation point without producing sustained oscillation. The Frequency control is used to select the audio frequency to be boosted.

In the High, Med. and Low positions of the switch the Reject control is operative. This is a screwdriver type adjustment located on the back of the chassis. The control has been pre-set at the factory so as to provide attenuation of any single undesired heterodyning audio frequency as selected by the Frequency control. Once adjusted at any one frequency the control need not be adjusted again for full maximum attenuation over the entire frequency control range. Further information on realignment of the Select-O-Ject controls are contained in Section 5. The Tone switch provides three positions of tonal value of the audio output amplifier as follows: Boost and High — normal Receiver reproduction in which an average tonal output is achieved; Med -- reproduction in which the higher tones are moderately attenuated; Low -- in this position the higher tones are subdued emphasizing the lower tones.

The Standby-Receive switch is used to quiet the Receiver during transmission periods or other times when it is desirable to be able to resume reception immediately after a period of silence (i.e. not having to wait for the tubes to warm up). The Standby-Receive switch should not be used to shut off the Receiver. The Receiver should be turned off by turning the A.F. Gain control to A.C. OFF position. The function of the Standby-Receive switch may be duplicated at an external (remote) position by connecting a switch or relay to terminals 5 and 8 of the A.C. jumper plug (P-1).

This is a parallel arrangement permitting the panel-mounted Standby-Receive switch to remain operative.

The main tuning control knob and the calibrated General Coverage scales on the slide-rule dial are used to tune the frequency range of the Receiver. The band of frequencies tuned at any one time is determined by the Band switch setting. To maintain correct calibration when using the main tuning knob the Bandspread slide-rule pointer must be at the "Set" mark located at the top right-hand side of the bandspread scales.

The Bandspread control knob and the five bandspread slide-rule dial scales are used to spread out the five specified Amateur bands covered by the Receiver. Each of these five scales is accurately calibrated in megacycles. A logging scale with linear markings from 0 to 100 is positioned so as to be available for use with either the General Coverage or Bandspread dial pointers. When this scale is utilized with the Bandspread pointer any small portion of the Receiver frequency range may be spread out over a wide range. Bandspread Tuning is accomplished by setting the General Coverage tuning dial pointer at the high-frequency limit of the band of frequencies to be spread and rotating the Bandspread control to tune in the desired signal. The various "set points" are marked directly on the General Coverage dial scales at the upper frequency limit of the amateur band being tuned and are easily located by the identifying circular markers.

3-2. VOICE OR MUSIC RECEPTION

After the NC-125 Receiver is properly installed, as outlined in Section 2, it is placed in operation by adjusting the receiver controls as follows. These instructions are illustrated on Figure Number 3.

1. Set the Standby-Receive switch at Receive.

2. Turn the R.F. Gain control to the extreme clockwise position.

3. Set the Control switch at A.V.C.

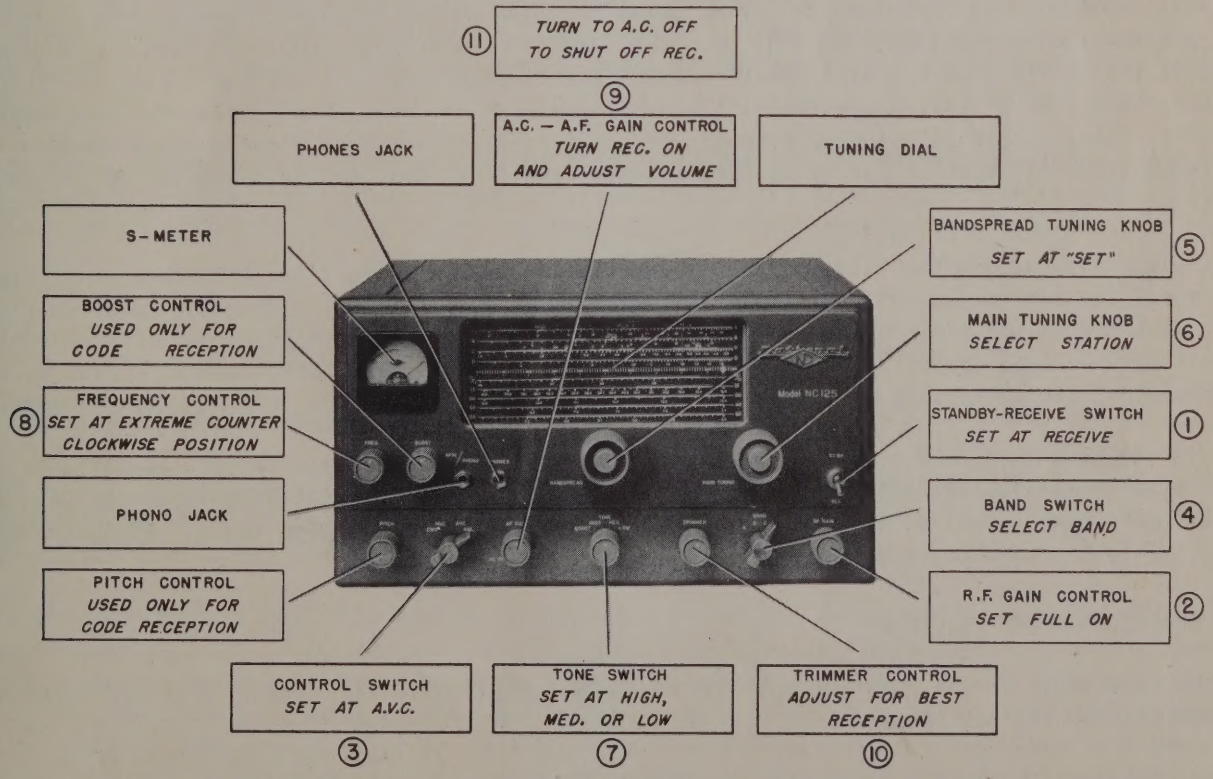

⑪ TURN TO A.C. OFF TO SHUT OFF REC.
⑨ A.C. – A.F. GAIN CONTROL TURN REC. ON AND ADJUST VOLUME
PHONES JACK
TUNING DIAL
S-METER
BANDSPREAD TUNING KNOB SET AT "SET" ⑤
BOOST CONTROL USED ONLY FOR CODE RECEPTION
MAIN TUNING KNOB SELECT STATION ⑥
⑧ FREQUENCY CONTROL SET AT EXTREME COUNTER CLOCKWISE POSITION
STANDBY-RECEIVE SWITCH SET AT RECEIVE ①
PHONO JACK
BAND SWITCH SELECT BAND ④
PITCH CONTROL USED ONLY FOR CODE RECEPTION
R.F. GAIN CONTROL SET FULL ON ②
CONTROL SWITCH SET AT A.V.C. ③
TONE SWITCH SET AT HIGH, MED. OR LOW ⑦
TRIMMER CONTROL ADJUST FOR BEST RECEPTION ⑩

Figure No. 3. Simplified Operating Instructions

4. Set the Band switch at the band of frequencies to be tuned. The standard broadcast band is band D.

5. Set the bandspread dial pointer at the "Set" mark.

6. Set the main tuning dial pointer at the desired frequency.

7. Turn the A.F. Gain - A.C. OFF control from the A.C. OFF position to the point providing the desired audio volume. Reset the main tuning dial pointer if necessary.

8. Set the Tone control switch at High, Med. or Low depending on the audio response desired. Set the Frequency control to the extreme counterclockwise limit of its rotation. The foregoing two settings render the boosting or rejecting effects of the Select-O-Ject circuit inoperative.

9. Adjust the Trimmer control for maximum response. Maximum response is clearly indicated by the S-Meter. The correct setting of the Trimmer control is indicated by maximum deflection of the S-Meter pointer. Alternately in the absence of a signal the Trimmer control may be set for maximum Receiver background noise.

The settings given above are for the reception of signals of average strength. An improvement in the reception of exceptionally weak signals or signals accompanied by interfering noise pulses may be realized by modification of the above settings.

For improvement in the reception of weak signals set the control switch at M.V.C. and modify the other control settings as follows:

1. Set the A.F. Gain control at approximately three-quarters rotation.

2. Adjust the audio volume by means of the R.F. Gain control.

When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, optimum noise-free reception will be had by setting the control switch at A.N.L. The resulting automatic limiting action will greatly reduce the interfering noise without noticeably affecting the signal. Best limiting action will be realized with the R.F. Gain control fully advanced; the audio volume should be adjusted by means of the A.F. Gain control. A further improvement in noise reduction will be realized by setting the Tone switch at Med. or Low depending on the degree of noise

In phone reception the built-in Select-O-Ject circuit furnishes a variable-frequency selective audio amplifier for the rejection of an interfering heterodyne. This is accomplished by setting the Tone switch in any position except that of Boost. Slowly adjust the Frequency control until a point of maximum attenuation of the undesired heterodyne is obtained. This rejection will be at the Frequency control setting which coincides with the audio frequency of the unwanted heterodyne.

The Boost position of the Tone switch is primarily intended for use in C.W. reception. However, in the reception or amplification of music the Boost and Frequency controls may be used to emphasize the bass output by setting the Tone switch at the Boost position and adjusting the Frequency control to obtain the desired bass boost.

3-3. CODE TELEGRAPHY RECEPTION

The adjustment of the receiver controls for code reception is the same as that for voice or music except for the following:

1. Set the control switch at C.W.O.

2. Set the A.F. Gain control at three-quarters rotation.

3. Adjust the audio volume by means of the R.F. Gain control.

4. Turning the Pitch control will change the characteristic pitch of the receiver background noise. This control enables the operator to vary at will the audio beat note of any C.W. signal to a preferred tone. The pitch will become higher as the beat frequency oscillator is detuned from the I.F. amplifier. The Pitch control is tuned to the I.F. frequency at the mid-point of the control's rotation (white dot at the top center). Turn the control to either side of zero beat until the characteristic pitch of receiver background noise is in the neighborhood of 2000 cycles. Under these conditions the audio beat note of any C.W. signal will show a broad peak at approximately 2000 cycles. This peak will appear on one side of the carrier only and on the other side the audio note will be considerably weaker. This characteristic, known as "single-signal", is helpful in receiving weak signals through interference.

For the reception of C.W. signals the action of the Select-O-Ject circuit is similar to that obtained in phone reception except that full use of the reject and boost capabilities of the circuit will be found very advantageous. Any desired degree of selectivity may be obtained by the adjustment of the Boost control from normal wide band reception to that of eliminating fundamental audio-frequency heterodynes Advancing the Boost control in a clockwise direction will increase the selectivity up to the point just below oscillation of the amplifier. At this point the selectivity obtained is very sharp and a ringing sound will accompany the tuned signal. The Frequency control is then used to select the single audio frequency to be boosted or rejected. Whether or not the audio frequency is boosted or rejected depends on the setting of the Tone switch. With the Tone switch in the Boost position the desired signal may be picked out and boosted. In all other positions of the Tone switch any single interfering signal or heterodyne may be rejected. An illustration of the characteristic curve of the Select-O-Ject performance is shown on Figure Number 1.

3-4. MEASUREMENT OF SIGNAL STRENGTH

The S-Meter in the NC-125 Receiver furnishes a means for the measurement of signal strength of incoming signals. To utilize the S-Meter the following control settings must be observed: R.F. Gain at 10, Control switch at A.V.C. or A.N.L. Adjust the R.F. Trimmer for maximum S-Meter reading of a particular incoming signal. The Tone, A.F. Gain, Boost or Frequency controls do not affect meter readings.

Tuning the Receiver to a signal will cause a meter deflection indicating the signal strength in S-Units or in decibels over the S-9 signal level. The correct dial setting for any specific station on the dial is that setting which provides maximum deflection of the meter pointer.

SECTION 4. MAINTENANCE AND TEST DATA

4-1. GENERAL MAINTENANCE DATA

The NC-125 is designed and constructed to assure a long period of uninterrupted service. A few service hints are given below to aid in locating individual components which, due to age or weakness, cause faulty operation of the Receiver.

Vacuum tube failure may be evidenced by reduction in sensitivity, intermittent operation or an inoperative Receiver. Tubes may be checked in suitable tube testing equipment or by replacement with tubes of proven quality. Care must be taken that tubes removed for checking are returned to their original sockets. Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind if replacement of the H.F. oscillator tube becomes necessary. A check of the dial calibration should be made if this tube is replaced to determine whether or not realignment is necessary.

Substitution of new I.F. amplifier or Select-O-Ject circuit tubes may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in Section 5.

In case of breakdown or failure of the Receiver, the fault must first be localized. This can often be accomplished by observation of some peculiar action of one of the controls. Reference to the circuit diagram will aid in checking voltages at the various tube elements. Measurement of voltages in accordance with Section 4-3 will most likely indicate where failure has occurred.

4-2. CIRCUIT FAILURES

All component parts in the NC-125 Receiver have been selected to assure an ample factor of safety. Failure may occur in individual cases and the most common cause of failure, excluding tubes, will probably be due to breakdown of a capacitor or resistor.

Bypass or filter capacitors which develop poor connections internally, or which become open-circuited, will cause decreased sensitivity, oscillation or poor stability. The defective unit can be located by temporarily connecting a good capacitor in parallel with each capacitor that is under suspicion.

Failure of any bypass or filter capacitor may seriously overload resistors in associated circuits. Overload of sufficient magnitude to permanently damage a resistor will cause the surface of the resistor to be scorched, making the defective component easy to locate by a good visual inspection.

Open or short-circuited resistors can be definitely located by measuring the resistance of each individual resistor. The schematic diagram should be consulted to make sure that any particular resistor under test is not connected in parallel with some other circuit element which might produce a false measurement.

Loose connections which cause intermittent or noisy operation can often be located by tapping or shaking any component under suspicion with the Receiver adjusted for normal operation.

4-3. VOLTAGE TABULATION

All voltage measurements should be made using a high-impedance vacuum tube voltmeter. Readings taken with any other type of instrument will vary somewhat depending upon the input resistance of the meter. Voltmeter resistance should be ten times larger than the resistance of the circuit across which the voltage is measured, otherwise the voltmeter will indicate a voltage lower than the actual voltage present. The tube socket voltage readings contained in the following table are tabulated using a high-impedance vacuum tube voltmeter with an input resistance of 11 megohms. The control settings to be observed are as follows:

(1) R.F. Gain control full on (extreme clockwise position).

(2) Frequency and Boost controls at the extreme counterclockwise position.

(3) Tone switch in High position.

(4) Control switch at M.V.C.

(5) Band switch at D and main tuning dial pointer set at high frequency limit on scale.

(6) A.F. Gain control full on (extreme clockwise position).

All voltages D.C. unless otherwise noted. Measured between specified terminal and chassis with a line voltage of 115-volts.

VOLTAGE TABLE

Tube	Pin No. 1	2	3	4	5	6	7	8
V-1, 6SG7	-	0	2.25	-.1	2.25	130	6.3 AC	210
V-2, 6SB7-Y	0	6.3 AC	240	90	-10	0	0	-
V-3, 6SG7	-	0	1.8	-.1	1.8	85	6.3 AC	240
V-4, 6SG7	-	0	2	-.1	2	120	6.3 AC	240
V-5, 6H6	-	0	-.4	-.4	-.6	0	6.3 AC	0
V-6, 6SL7GT	0	120	1.35	1.35	120	2.8	6.3 AC	0
V-7, 6SL7GT	2.5	115	3.9	2.9	115	4	6.3 AC	0
V-8, 6SL7GT	0	96	2.2	0	125	1.0	0	6.3 AC
V-9, 6V6GT	0	6.3 AC	235	260	0	-	0	13
V-10, 0A2	-	0	-	-	150	-	-	-
V-11, 5Y3GT	-	280	-	250 AC	-	250 AC	-	280

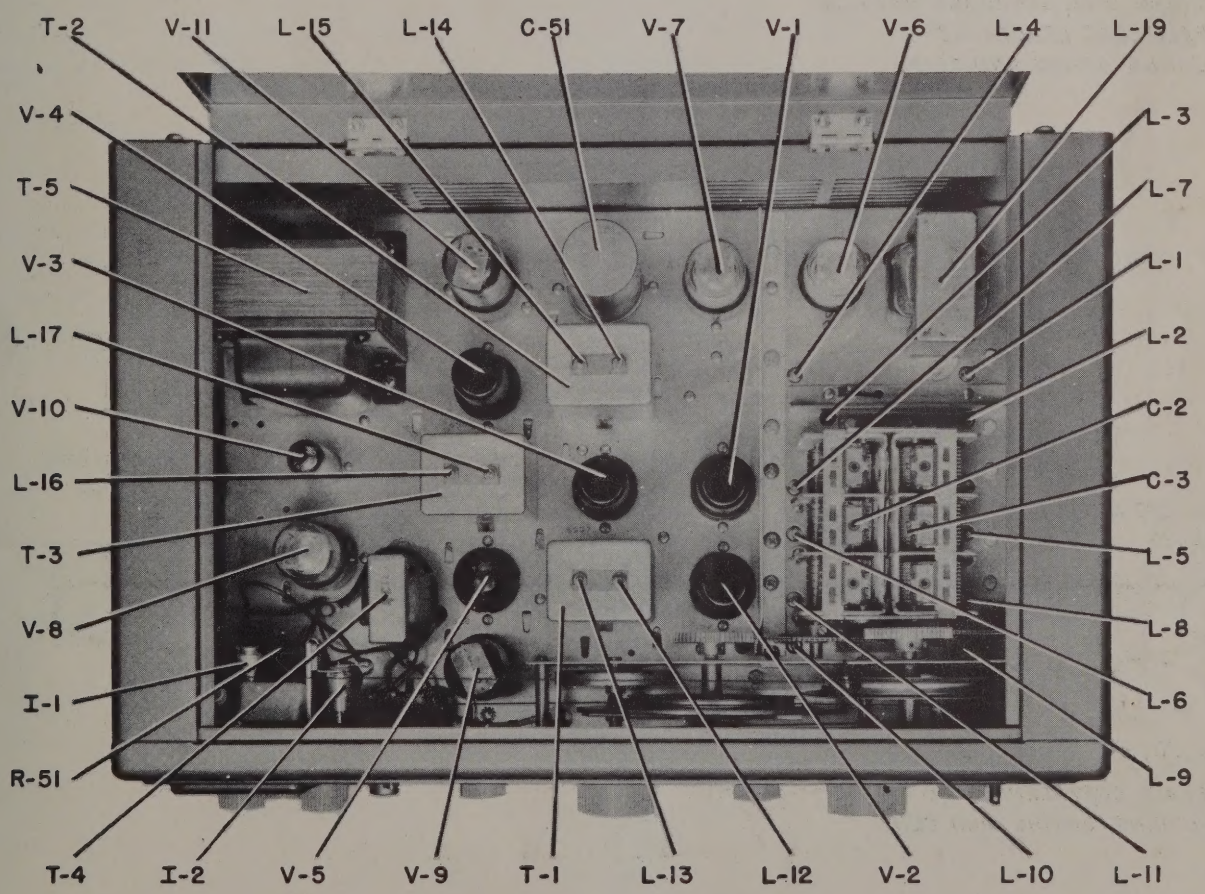
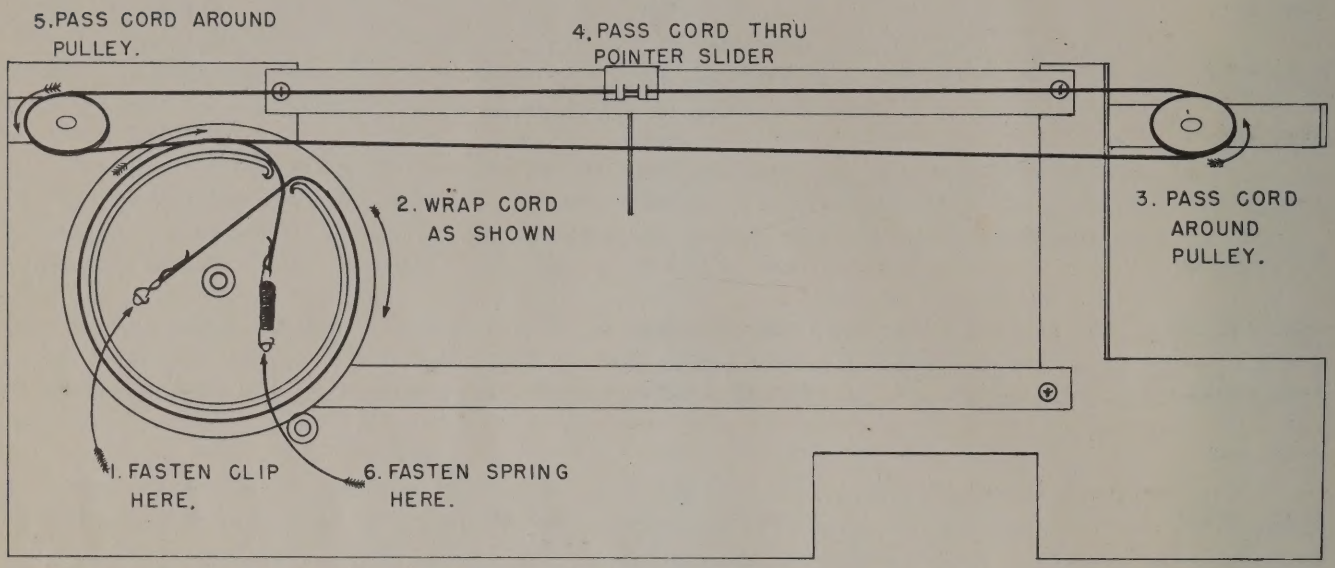


Figure No. 4. Top View of Receiver

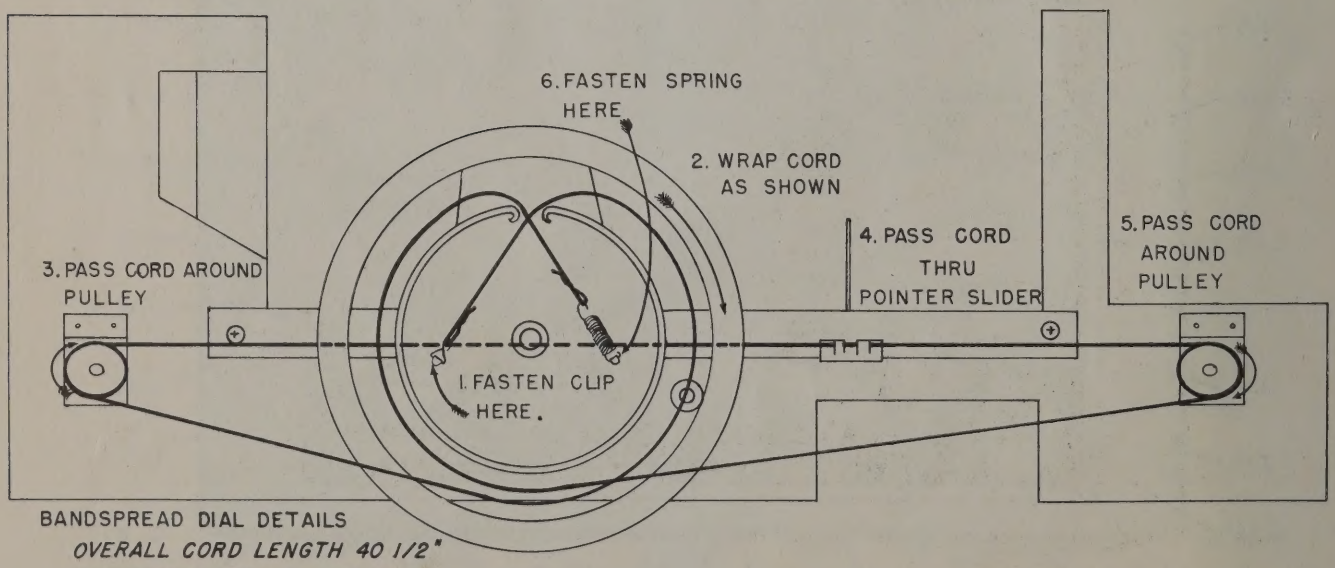
4-4. SLIDE-RULE TUNING DIAL

The cord used in the dial drives is especially selected for its long life properties. If replacement should become necessary refer to Figure No. 5 for stringing instructions.


5. PASS CORD AROUND PULLEY.
4. PASS CORD THRU POINTER SLIDER
2. WRAP CORD AS SHOWN
3. PASS CORD AROUND PULLEY.
1. FASTEN CLIP HERE.
6. FASTEN SPRING HERE.

MAIN TUNING DIAL STRINGING DETAILS
OVERALL CORD LENGTH 43"
INCLUDING SPRING AND CLIP

NOTE: Both cords are shown exposed for clarity.


6. FASTEN SPRING HERE
2. WRAP CORD AS SHOWN
4. PASS CORD THRU POINTER SLIDER
5. PASS CORD AROUND PULLEY
3. PASS CORD AROUND PULLEY
1. FASTEN CLIP HERE.

BANDSPREAD DIAL DETAILS
OVERALL CORD LENGTH 40 1/2"
INCLUDING SPRING AND CLIP

Figure No. 5. Dial Stringing Instructions

SECTION 5. ALIGNMENT

5-1. GENERAL

All circuits of the NC-125 have been carefully aligned before shipment using precision test equipment insuring accurate conformability to the alignment frequency. No realignment will be required unless the Receiver is tampered with or component parts or tube replacements have been necessary.

The necessity for any realignment may be determined by checking the performance of the Receiver, as outlined in Section 3, and the dial calibration. It is recommended that, if tests indicate realignment is required, the instructions given in this section should be thoroughly read and understood before alignment is attempted

Complete alignment of the Receiver can be divided into two steps as follows:

1. Intermediate - Frequency Amplifier Alignment.
2. General Coverage Alignment:
   (a) High-Frequency Oscillator
   (b) First Detector and R.F. Amplifier

All circuits must be tuned in the above order when complete alignment is required. All alignment adjustments and controls are shown on Figure Numbers 4, 6, 7 and 8.

5-2. I.F. AMPLIFIER ALIGNMENT

The intermediate frequency of the NC-125 Receiver is 455 kilocycles. The two I.F. transformers, C.W.O. transformer and the second detector input transformer have permeability tuned iron-core inductors with trim-screw adjustments for alignment purposes. These adjustments are accessible from the top inside of the cabinet as shown on Figure Number 4.

The alignment procedure is as follows:

1. Connect an output meter having an 8-ohm resistive load to the matching output terminals on the Receiver. Alternately this output meter may be plugged into the phones jack.
2. Connect the high output lead of an accurately calibrated signal generator to the stator of the detector portion of the main tuning capacitor, C-2B, and the ground lead to any convenient point on the chassis. This is a direct connection. Set the signal generator at 455 kilocycles and turn the modulation on.
3. Set the Control switch at M.V.C.
4. Set the R.F. Gain control full on (extreme clockwise position).
5. Set the Frequency control at the extreme counterclockwise position.
6. Set the Tone switch at High.
7. Set the A.F. Gain control full on (extreme clockwise position).
8. Adjust the output attenuator of the signal generator to provide a signal of approximately 100 microvolts. While making I.F. amplifier adjustments, it will be necessary to retard the attenuator of the signal generator as I.F. amplifier gain increases to a point where overload occurs.
9. Adjust the I.F. tuned inductors, L-12 through L-17 inclusive, for maximum gain, as indicated on the output meter. The order in which these adjustments are made is not important.

At the conclusion of the I.F. amplifier alignment the tuning of the C.W. oscillator may be checked by turning the modulation of the signal generator off and setting the control switch at C.W.O. With this setting zero beat of the test signal should occur with the Pitch control set at mid-scale. If the above test indicates realignment of the C.W. oscillator is required proceed as follows:

1. Remove the bottom cover of the Receiver.

2. Loosen the set screw on the collar of the C.W. oscillator transformer shaft.

3. Without loosening the Pitch control knob on its shaft withdraw the knob and shaft from the cabinet.

4. The screw driver adjustment on the C.W. oscillator inductor L-18 will then be accessible through the shaft opening in the cabinet. Adjust L-18 for zero beat with the test signal.

5. Replace the Pitch control knob and shaft so that the white dot on the knob is at mid-scale.

6. Position the collar so that the set screw is directly opposite (180^{o}) from the stop and tighten the set screw making sure that the position of the Pitch control knob does not change from mid-scale.

5-3. GENERAL COVERAGE ALIGNMENT

General coverage alignment and bandspread alignment are accomplished simultaneously, since the main tuning and bandspread tuning capacitors are connected in parallel on all bands. The Receiver should be set up as specified in Section 2-1 except that the antenna should be disconnected. Adjustment of the H.F. oscillator and first detector trimmers can be made through the holes in the bottom cover of the Receiver after removal of the small cover plate. See Figure No. 6. Some inductor adjustments are accessible from the top inside of the cabinet: all except L-11 and L-7 from the bottom of chassis. Adjustments on top of the chassis are made using the trim screws, adjustments on the bottom are made using the slotted iron cores. The preliminary alignment procedure is as follows:

1. Connect an output meter having a 8-ohm resistive load to the output terminal panel on the Receiver.

2. Connect an accurate signal source (signal generator or crystal-controlled test oscillators) to the antenna input terminals through a standard dummy antenna of 300 ohms.

3. Set the Control switch at M.V.C.

4. Set the R.F. Gain control full on.

5. Set the Frequency control at the extreme counterclockwise limit of rotation.

6. Set the Tone switch at High.

7. Set the A.F. Gain control to provide a suitable output level.

8. Set the Bandspread and General Coverage slide-rule dial pointers as shown on the Alignment Table contained in this section.

The complete procedure for alignment of the high-frequency oscillator, first detector and R.F. amplifier stage is outlined in a step by step manner on the Alignment Table. The sequence of steps should be strictly adhered to.

Particular care must be taken when adjusting the high frequency oscillator trimmers. It is imperative that the oscillator is aligned to the fundamental frequency and not the image. This can be checked by tuning in the image frequency of the test signal. On the A Band the image should appear 910 kilocycles above the fundamental signal. On the B, C, and D bands the image should appear 910 kilocycles below the fundamental signal. If the image does not appear at its correct setting the high-frequency oscillator trimmer must be adjusted until the image and fundamental signals appear at the proper points on the dial.

ALIGNMENT TABLE

Step	Band	Adjust Signal Source To:	Set Main Tun. Pointer At:	Set Bandspread Pointer At:	Adjust To Receive Test Signal	Adjust for Maximum Output
1	A	34.0 Mc.	34.0 Mc.	Set	C-18	C-12, C-5
2	A	12.0 Mc	12.0 Mc	Set	L-8	L-20#*, L-1
3	A	34.0 Mc.	34.0 Mc.	Set		Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	B	12.0 Mc	12.0 Mc.	Set	C-20	C-14, C-5
2	B	4.4 Mc.	4.4 Mc.	Set	L-9	L-5, L-2
3	B	12.0 Mc.	12.0 Mc.	Set		Check Step 1. Repeat Step 1, 2 and 3 if necessary.
1	C	4.4 Mc.	4.4 Mc.	Set	C-22	C-15, C-5
2	C	1.6 Mc.	1.6 Mc.	Set	L-10	L-6*, L-3
3	C	4.4 Mc.	4.4 Mc.	Set		Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	D	0.6 Mc.	0.6 Mc.	Zerp	L-11**	L-7**, L-4
2	D	1.5 Mc.	1.5 Mc.	Set	C-24	C-16, C-5
3	D	0.6 Mc.	0.6 Mc.	Set		Check Step 1. Repeat Steps 1, 2 and 3 if necessary.

#Loop inside coil form for adjustment.
*Accessible only from bottom of chassis.
**Accessible only from top of chassis.

5-4. SELECT-O-JECT CIRCUIT ALIGNMENT

The Select-O-Ject circuit has been pre-set at the factory to provide optimum operating efficiency. If the Reject control has been tampered with or a tube or component part replacement has been made, readjustment may be necessary. This is accomplished in the following manner:

1. Set up the receiver for normal operation as outlined in Section 3.
2. Set the TONE control at either the High, Medium or Low position.
3. Connect a signal generator to the antenna input terminals on a frequency of 1000 kc. with the modulation set to the 400 cycle position.
4. Set the REJECT control on the rear of the chassis for maximum rejection of the 400 cycle note.

5. Set the FREQUENCY control on the front of the panel for a finer rejection of the 400 cycle signal. This adjustment is critical and should be carefully adjusted.

6. Simultaneously adjust both controls for maximum rejection of the 400 cycle note.

5-5. S. METER ADJUSTMENT

Two adjustments are provided to assure correct operation of the S-Meter; one mechanical and the other electrical.

1. Mechanical — With the Receiver turned off, the meter pointer should read 40 db. (the last scale marking). If it does not, correction is effected by the screw adjustment on the front of the meter.

2. Electrical — With the Receiver turned on and controls adjusted for meter operation, the meter pointer should read zero (the first scale marking). This test must be made with no signal input to the Receiver. Correction of the zero setting, if required, is made by means of the S-Meter balancing resistor, R-51. This is a screwdriver type adjustment whose location is shown on Figure Number 4.

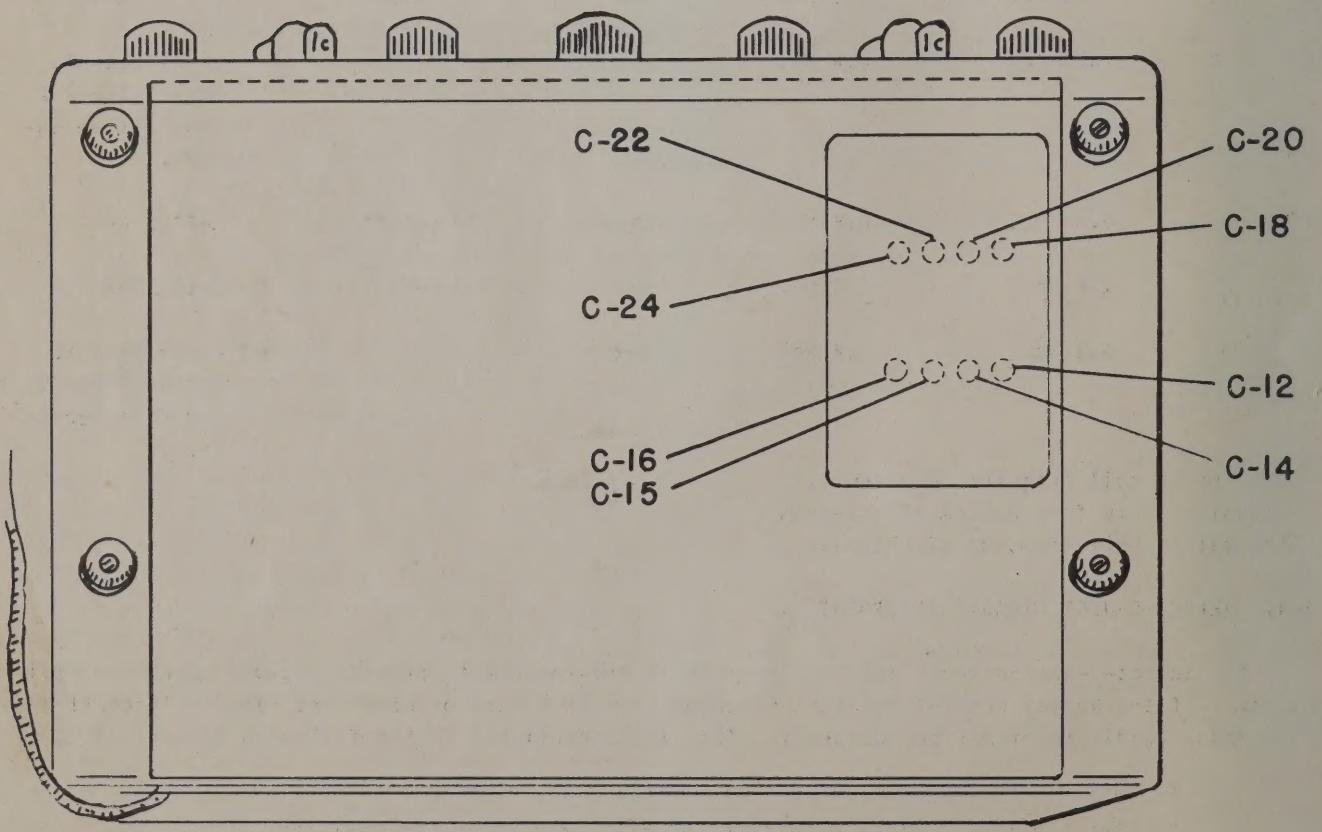


Figure No. 6. R.F. Alignment Trimmer Locations

PARTS LIST

Symbol	Description	Nat. Co. Type
	CAPACITORS	
C-1	Paper .01 mfd 400 vdcw	D827-5
C-2	Air variable 2 section	SA:8102
C-2A	10-25 mmf bandspread	Part of C-2
C-2B	10-25 mmf bandspread	Part of C-2
C-2C	10-25 mmf bandspread	Part of C-2
C-3A	10-441.7 mmf main tuning	Part of C-2
C-3B	10-441.7 mmf main tuning	Part of C-2
C-3C	10-441.7 mmf main tuning	Part of C-2
C-4	Not used	
C-5	Variable air 3-40 mmf	SA:9988
C-6	Mica 1000 mmf 500 vdcw	J665-71
C-7	Paper .01 mfd 400 vdcw	D827-5
C-8	Paper .01 mfd 400 vdcw	D827-5
C-9	Mica .001 mfd 300 vdcw	J665-71
C-10	Not used	
C-11	Ceramic 15 mmf 500 vdcw	D825D-405
C-12	Variable mica 1.8-40 mmf	D832-3
C-13	Ceramic 5 mmf 500 vdcw	D825D-401
C-14	Variable mica 1.8-40 mmf	D832-3
C-15	Variable mica 1.8-40 mmf	D832-3
C-16	Variable mica 1.8-40 mmf	D832-3
C-17	Not used	
C-18	Variable ceramic 5-20 mmf	E311-2
C-19	Mica .0043 mfd 500 vdcw	J666-37
C-20	Variable ceramic 5-20 mmf	E311-2
C-21	Mica .0013 mfd ±5% 500 vdcw	J666-18
C-22	Variable ceramic 5-20 mmf	E311-2
C-23	Mica 510 mmf 500 vdcw	H500-5
C-24	Variable ceramic 5-20 mmf	E311-2
C-25	Ceramic 10 mmf 500 vdcw	D825D-402
C-26	Dry electrolytic 20 mfd 450 vdcw	E338-3
C-27	Mica 100 mmf 500 vdcw	J665-32
C-28	Paper .01 mfd 400 vdcw	D827-5
C-29	Mica 510 mmf 500 vdcw	H500-5
C-30	Mica 510 mmf 500 vdcw	H500-5
C-31	Paper .01 mfd 400 vdcw	D827-5
C-32	Paper .01 mfd 400 vdcw	D827-5
C-33	Paper .1 mfd 400 vdcw	D827-12
C-34	Paper .1 mfd 400 vdcw	D827-12
C-35	Paper .01 mfd 400 vdcw	D827-5
C-36	Mica 510 mmf 500 vdcw	H500-5
C-37	Mica 510 mmf 500 vdcw	H500-5
C-38	Paper .01 mfd 400 vdcw	D827-5
C-39	Paper .01 mfd 400 vdcw	D827-5

Symbol	Description	Nat. Co. Type
	CAPACITORS (CONT'D)	
C-40	Paper .1 mfd 400 vdcw	D827-12
C-41	Paper .01 mfd 400 vdcw	D827-5
C-42	Mica 510 mmf 500 vdcw	H500-5
C-43	Mica 510 mmf 500 vdcw	H500-5
C-44	Mica 100 mmf 500 vdcw	J665-32
C-45	Paper .1 mfd 400 vdcw	D827-12
C-46	Paper .01 mfd 400 vdcw	D827-5
C-47	Paper .01 mfd 400 vdcw	D827-5
C-48	Paper .05 mfd 400 vdcw	D827-1
C-49	Paper .05 mfd 400 vdcw	D827-1
C-50	Mica .001 mfd 500 vdcw	J666-14
C-51	Dry electrolytic 450 vdcw	K945-1
C-51A	40 mfd	Part of C-51
C-51B	40 mfd	Part of C-51
C-52	Mica .001 mfd 500 vdcw	J666-14
C-53	Paper .05 mfd 400 vdcw	D827-1
C-54	Paper .05 mfd 400 vdcw	D827-1
C-55	Paper .05 mfd 400 vdcw	D827-1
C-56	Dry electrolytic 10 mfd 50 vdcw	E338-9
C-57	Mica 270 mmf 500 vdcw	J665-47
C-58	Paper .01 mfd 400 vdcw	D827-5
C-59	Mica 220 mmf 500 vdcw	H500-21
C-60	Paper .001 mfd 500 vdcw	D827-32
C-61	Dry electrolytic 25 mfd 50 vdcw	E338-4
C-62	Paper .02 mfd 600 vdcw	D827-44
C-63	Paper .01 mfd 400 vdcw	D827-5
C-64	Paper .01 mfd 400 vdcw	D827-5
	RESISTORS	
R-1	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-2	Fixed 150,000 ohms 1/2 watt	J569-51
R-3	Fixed 220 ohms 1/2 watt	J569-17
R-4	Variable wire wound 10,000 ohms	K349-1
R-5	Fixed 150,000 ohms 1/2 watt	J569-51
R-6	Fixed 1000 ohms 1/2 watt	J569-25
R-7	Fixed 4700 ohms 1/2 watt	J569-33
R-8	Fixed 33 ohms 1/2 watt	J569-7
R-9	Fixed 22,000 ohms 1/2 watt	J569-41
R-10	Fixed 3900 ohms 1/2 watt	J569-32
R-11	Fixed 1000 ohms 1/2 watt	J569-25
R-12	Fixed 470,000 ohms 1/2 watt	J569-57
R-13	Fixed 330 to 2200 ohms 1/2 watt	
R-14	Fixed 150,000 ohms 1 watt	J571-51
R-15	Fixed 1000 ohms 1/2 watt	J569-25

PARTS LIST

Symbol	Description	Nat. Co. Type
	RESISTORS (CONT'D)	
R-16	Fixed 470,000 ohms 1/2 watt	J569-57
R-17	Fixed 220 ohms 1/2 watt	J569-17
R-18	Fixed 2,200 ohms 1/2 watt	J569-29
R-19	Fixed 2,200,000 ohms 1/2 watt	J569-65
R-20	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-21	Fixed 100,000 ohms 1/2 watt	J569-49
R-22	Fixed 33,000 ohms 1/2 watt	J569-43
R-23	Fixed 10,000 ohms 1/2 watt	J569-37
R-24	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-25	Fixed 330,000 ohms 1/2 watt	J569-55
R-26	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-27*	Fixed 1800 ohms	
R-28*	Fixed 1800 ohms	
R-29	Variable dual control	M879-2
R-29A	2,500,000 ohms	Part of R-29
R-29B	2,500,000 ohms	Part of R-29
R-30	Fixed 100,000 ohms 1/2 watt	J569-37
R-31**	Fixed 3900 ohms	
R-32**	Fixed 3900 ohms	
R-33	Fixed 10,000 ohms 1/2 watt	J569-37
R-34	Fixed 22,000 ohms 1/2 watt	J569-41
R-35	Variable 500,000 ohms	J533-9
R-36	Variable 500,000 ohms screw-driver control	J533-7
R-37	Fixed 5600 ohms 1/2 watt	J569-33
R-38	Fixed 22,000 ohms 1/2 watt	J569-41
R-39	Fixed 22,000 ohms 1/2 watt	J569-41
R-40	Fixed 1800 ohms 1/2 watt	J569-28
R-41	Fixed 3300 ohms 1/2 watt	J569-31
R-42	Variable with switch 500,000 ohms	K347-1
R-43	Fixed 100,000 ohms 1/2 watt	J569-49
R-44	Fixed 2700 ohms 1/2 watt	J569-30
R-45	Fixed 22,000 ohms 1/2 watt	J569-41
R-46	Fixed 470,000 ohms 1/2 watt	J569-57
R-47	Fixed 330 ohms 2 watt	J572-19
R-48	Fixed 47,000 ohms 1/2 watt	J569-45
R-49	Fixed 33,000 ohms 1/2 watt	J569-43
R-50	Fixed 330 ohms 1/2 watt	J569-19
R-51	Variable 1000 ohms 1/2 watt	D831-2
R-52	Fixed 3900 ohms 10 watt	E959-12
R-53	Fixed 180,000 ohms 1/2 watt	J569-52
R-54	Fixed wire wound 4.3 ohms 1 watt	K098-48
R-55	Fixed 22 ohms 1/2 watt	J569-5

*Must be paired within 2% of each other

**Must be paired within 2% of each other

Symbol	Description	Nat. Co. Type
	MISCELLANEOUS	
E-1	Terminal board: antenna 3 terminal	E261-3
E-2	Terminal board: speaker 2 terminal	E265-8
I-1	Lamp: bayonet type, #47 6-8 volts - .15 amps	F136-11
I-2	Lamp: bayonet type #47 6-8 volts - .15 amps	F136-11
I-3	Lamp: bayonet type, #47 6-8 volts - .15 amps	F136-11
J-1	Phone jack: midget type closed circuit	K314-1
J-2	Phone jack: midget type closed circuit	K314-1
L-1	Inductor, RF for 'A' band, variable iron core	SA:4863
L-2	Inductor, RF: for 'B' band, variable iron core	SA:4867
L-3	Inductor, RF: for 'C' band, variable iron core	SA:4665
L-4	Inductor, RF: for 'D' band, variable iron core	SA:4666
L-5	Inductor, RF: for 'B' band, variable iron core	SA:4872
L-6	Inductor, RF: for 'C' band, variable iron core	SA:4873
L-7	Inductor, RF: for 'D' band, variable iron core	SA:4874
L-8	Inductor, RF: for 'A' band, variable iron core	SA:4866
L-9	Inductor, RF: for 'B' band, variable iron core	SA:4868
L-10	Inductor, RF: for 'C' band, variable iron core	SA:4658
L-11	Inductor, RF: for 'D' band, variable iron core	SA:4871
L-12	Inductor, IF: T-1 primary, variable iron core	SA:3366
L-13	Inductor, IF: T-1 secondary, variable iron core	SA:4537
L-14	Inductor, IF: T-2 primary, variable iron core	SA:3366
L-15	Inductor, IF: T-2 secondary, variable iron core	SA:3905
L-16	Inductor, IF: T-3 primary, variable iron core	SA:3366
L-17	Inductor, IF: T-3 secondary, variable iron core	SA:3905
L-18	Inductor, BFO: variable brass core	SA:5361

PARTS LIST

Symbol	Description	Nat. Co. Type
	MISCELLANEOUS (CONT'D)	
L-19	Choke: iron core, 120 cycles 10 henries, 100 ma, 300 ohms	K317-1
L-20	Inductor RF: variable iron core, 'A' band	SA:4870
M-1	Meter: illuminated, 0-1 milliampere range	J984-3
P-1	Plug, 8 prong with 2 jumpers	SA:3731
S-1	Switch: band selector; wafer type	K752-1
S-1A	Part of S-1; single pole 4 pos	
S-1B	Part of S-1; single pole 4 pos	
S-2	Switch: band selector; wafer type	K752-1
S-2A	Part of S-2; single pole 4 pos	
S-2B	Part of S-2; single pole 4 pos	
S-3	Switch: band selector; wafer type	K752-1
S-3A	Part of S-3; single pole 4 pos	
S-3B	Part of S-3; single pole 4 pos	
S-4	Switch: AVC, ANL wafer type, 4 pole, 4 pos	SA:7622
S-4A	Part of S-4; single pole 4 pos	
S-4B	Part of S-4; single pole 4 pos	
S-4C	Part of S-4; single pole 4 pos	
S-4D	Part of S-4; single pole 4 pos	
S-5	Switch: band selector; wafer type	SA:7621
S-5A	Part of S-5; single pole 4 pos	
S-5B	Part of S-5; single pole 4 pos	
S-6	Switch: SPST	Part of R-42
S-7	Switch: single pole single throw toggle	E230-2
T-1	Transformer: IF; 455 kc, single primary double secondary shielded	SA:4875
T-2	Transformer: IF; 455 kc single primary and secondary shielded	SA:4533
T-3	Transformer: IF; 455 kc single primary and secondary shielded	SA:4533
T-4	Transformer: audio output, unshielded, 5000 ohms primary 3.2 ohms secondary	K313-1

Symbol	Description	Nat. Co. Type
	MISCELLANEOUS (CONT'D)	
T-5	Transformer: power, 115 v 60 cycles AC primary voltage 300 v at 100 ma, 5 v at 2 amps, 6.3 v at 3.0 amps secondary	K316-2
V-1	Tube, electron, semi variable mhu pentode, octal type 6SG7	
V-2	Tube; electron, pentagrid converter, octal type 6SB7	
V-3	Tube; electron, semi variable mhu pentode, octal type 6SG7	
V-4	Tube; electron , semi variable-mhu pentode octal type 6SG7	
V-5	Tube; electron, twin diode, octal type 6H6	
V-6	Tube; electron, double triode, octal type 6SL7GT	
V-7	Tube; electron, double triode, octal type 6SL7GT	
V-8	Tube: electron, double triode, octal type 6SL7GT	
V-9	Tube: electron, beam pentode, octal type 6V6GT	
V-10	Tube; electron, glow discharge diode miniature type 0A2	
V-11	Tube; electron, double diode, octal type 5Y3GT	
X-1	Socket, octal type	K235-1
X-2	Socket, octal type	K235-1
	MECHANICAL PARTS	
	Angle, 8 1/2 inches long top of chassis	P702-1
	Angle, for cover (2)	K788-1
	Angle, 4 1/8 inches long top of chassis	P703-1
	Angle, mounted on bottom sides of chassis (2)	K259-1
	Bracket,to hold trimmers in oscillator compartment	K584-1
	Back for cabinet	K247-3
	Bumper, for cover (2)	L180-1
	Bottom, for cabinet	K234-4
	Bracket, supports drive mechanism (2)	P730-1
	Board, backing for drive mechanism	P722-1
	Chassis, less components	SA:8101
	Holder, coil form (12)	K582-2
	Core, iron; for bandswitch coils (10)	H408-7
	Core, brass; for oscillator coil	K782-1

MECHANICAL PARTS

Description	Nat. Co. Type
Compartment, oscillator; complete with coils and parts	SA:7598
Compartment, RF: complete with coils and parts	SA:7600
Compartment, mixer, complete with coils and parts	SA:7599
Cabinet welded wraparound, less jacks switch and meter	SA:8114
Cover, for cabinet	K239-3
Coupling for shafts (2)	SA:5277
Channel for dial	P718-1
Cord, for Bandspread dial	SA:8112
Cord, for Main Tuning dial	SA:8113
Detent, for band change switch	Q403-1
Drive mechanism for main tuning capacitor complete	SA:8103
Dial	P719-1
Foot, felt (4)	E293-3
Flywheel on drive shaft	SA:8108
Grommet, rubber	E923-11
Hinge, (2)	J825-2
Insulator, ceramic standoff	B425-1
Lug, one ground terminal and one eyelet to the left	D947-1
Lug, one ground terminal and one eyelet to the right	D947-2
Lug, one eyelet on ground terminal and one to the left	D947-3
Lug, one eyelet to either side of ground terminal (2)	D947-4
Lug, one ground terminal and 2 eyelets to the left (2)	D947-7
Lug, one ground terminal, one eyelet to the left and two to the right	D947-9
Lug, one eyelet on ground terminal and one to the right	D947-12
.ug, one eyelet on ground terminal 2 to the left and 1 to the right	D947-14
Lug, one eyelet on ground terminal, 2 to the left and 2 to the right	D947-18
Lock, for power cord	K172-1
Lug, ground (3)	E903-1
Lug, ground (10)	F774-1
Plug, button type, rear of chassis	F190-28
Plate, for mounting electrolytic capacitor	K042-1
Plate, cover 5 1/2" x3"	K593-1
Plate, front of set	SA:8104
Plate for rear of Drive mechanism	SA:8110

Description	Nat. Co. Type
Pointer, dial	P729-1
Socket, (8) molded (black)	J625-1
Socket, (4) mica filled bakelite (yellow)	J625-2
Socket, (1) miniature bakelite	M575-1
Shield, metal bracket for oscillator and mixer sections	SA:4879
Shield, metal bracket for RF section	SA:4878
Socket, to fit miniature bayonet base lamp	K377-4
Socket, for dial light (2)	J721-3
Shaft, band switch 6 7/8" long	J685-4
Shaft, for trimmer capacitor, brass 5 9/16" long	L084-2
Shaft, Bandspread pinch	SA:8106
Shaft, bandspread drive	SA:8107
Shaft, main tuning pinch	SA:8109
Shaft, main tuning drive	SA:8110
Wafer, bakelite for band switch	K752-1
Wheel, pinch (2)	K810-1

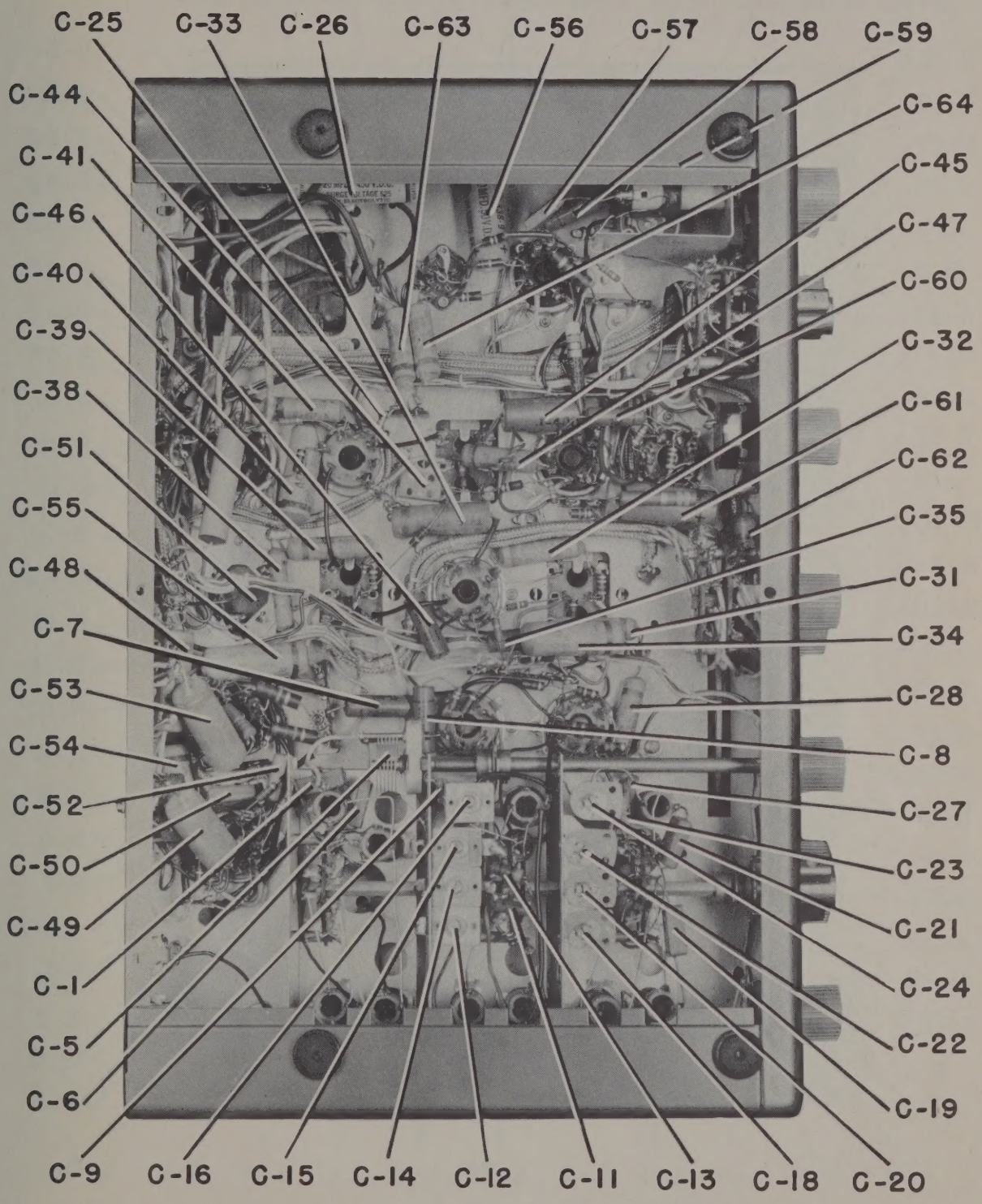


Figure No. 7. Capacitor Locations, Bottom View of Receiver

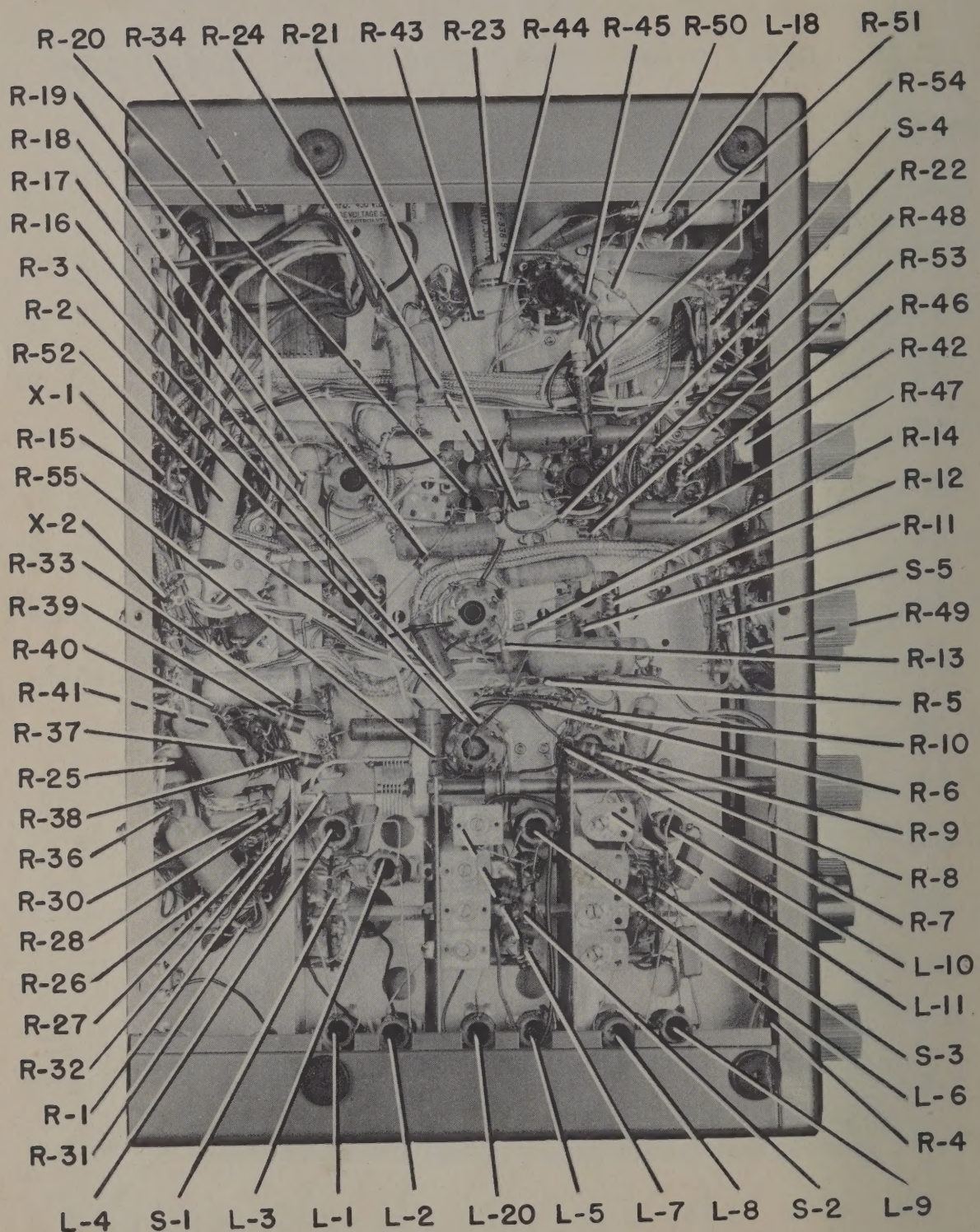


Figure No. 8. Resistor and other Component Locations, Bottom View of Receiver

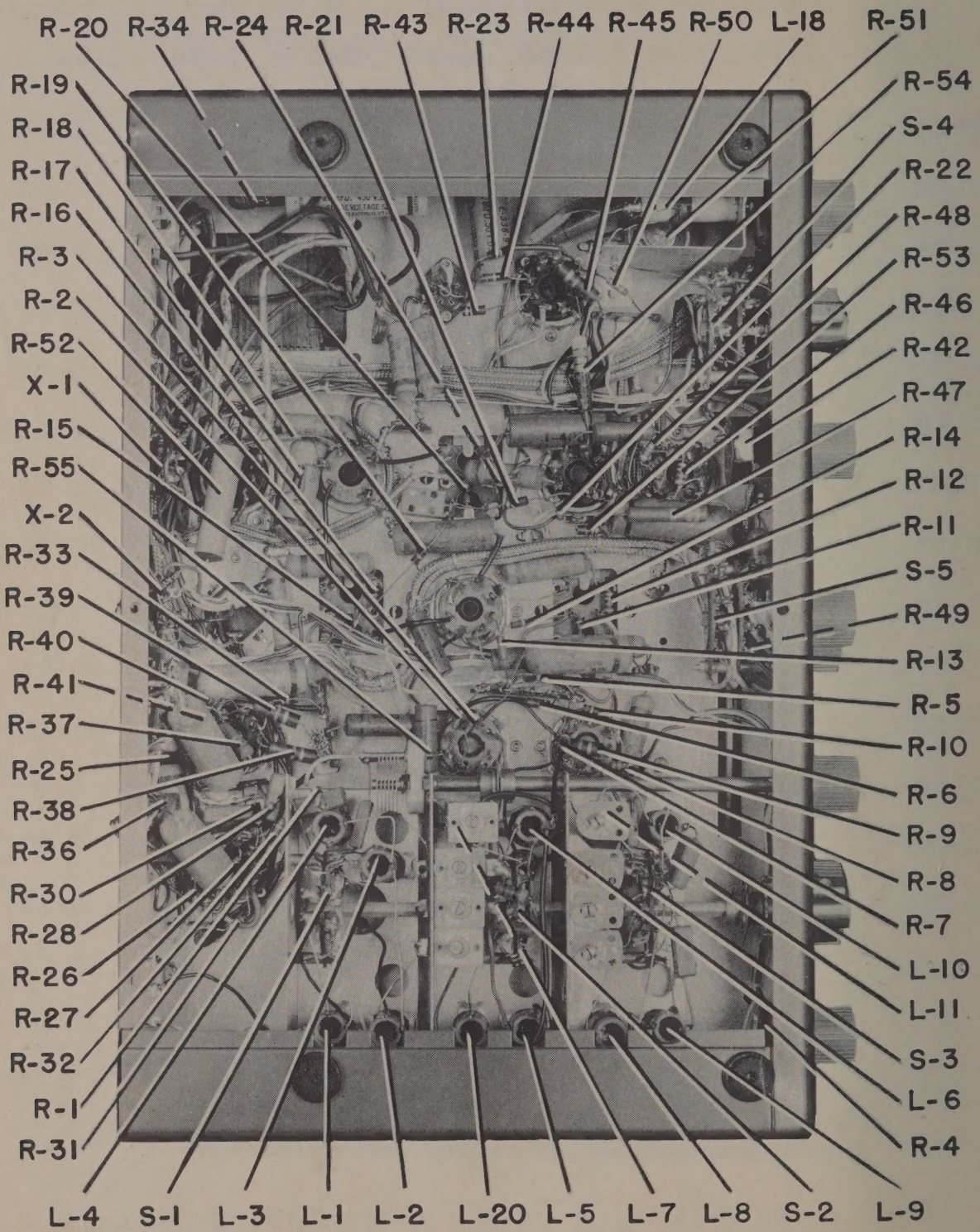
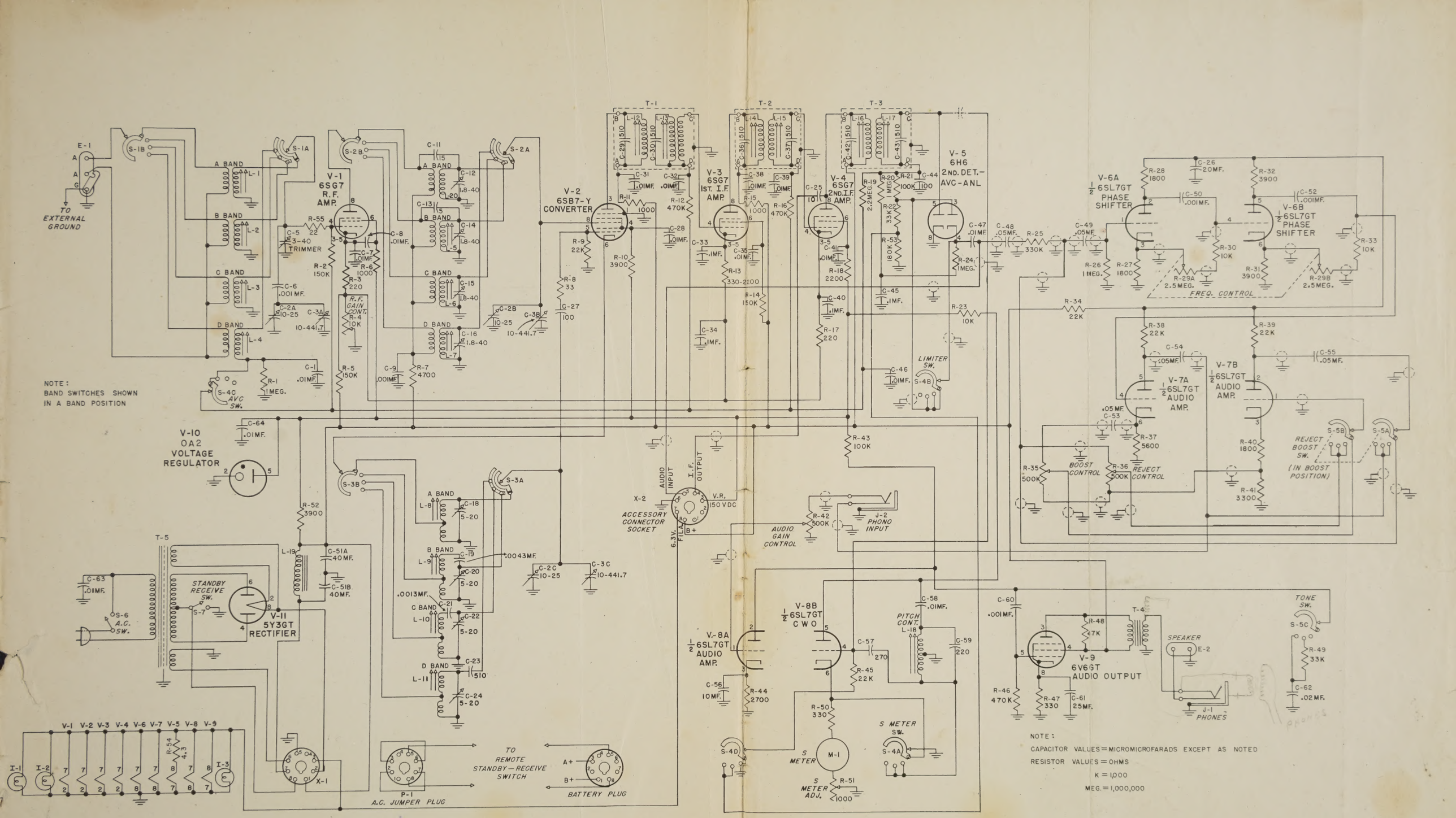


Figure No. 8. Resistor and other Component Locations, Bottom View of Receiver



NOTE:
BAND SWITCHES SHOWN IN A BAND POSITION

NOTE:
CAPACITOR VALUES = MICROMICROFARADS EXCEPT AS NOTED
RESISTOR VALUES = OHMS
K = 1,000
MEG. = 1,000,000

Figure No. 9. Schematic Diagram

Standard Form Warranty

Adopted by the Radio Manufacturers Association, Inc.

This equipment is warranted to be free from defective material and workmanship and repair or replacement will be made of any part which under normal installation, use and service discloses defect, provided the unit is delivered by the owner to the manufacturer or through the authorized radio dealer or wholesaler from whom purchased, intact, for examination, with all transportation charges prepaid to the factory, within ninety days from the date of original shipment from the factory, and provided that such examination discloses in the manufacturer's judgment that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring, improper installation, or to use in violation of instructions furnished by the manufacturer, nor extend to units which have been repaired or altered outside of the factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith of other manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for the manufacturer any other liability in connection with the sale of their radio products.

National Company, Inc. reserves the right to make any change in design or to make addition to, or improvements in, its products without imposing any obligations upon itself to install them in its products previously manufactured.

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National

EST. 1914

NATIONAL COMPANY, INC.
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ER: 348, 358

INSTRUCTION MANUAL

for

THE NATIONAL MODEL NC-125

RADIO RECEIVER

A truly versatile Receiver in a compact, modern package at an attractive low price . . .

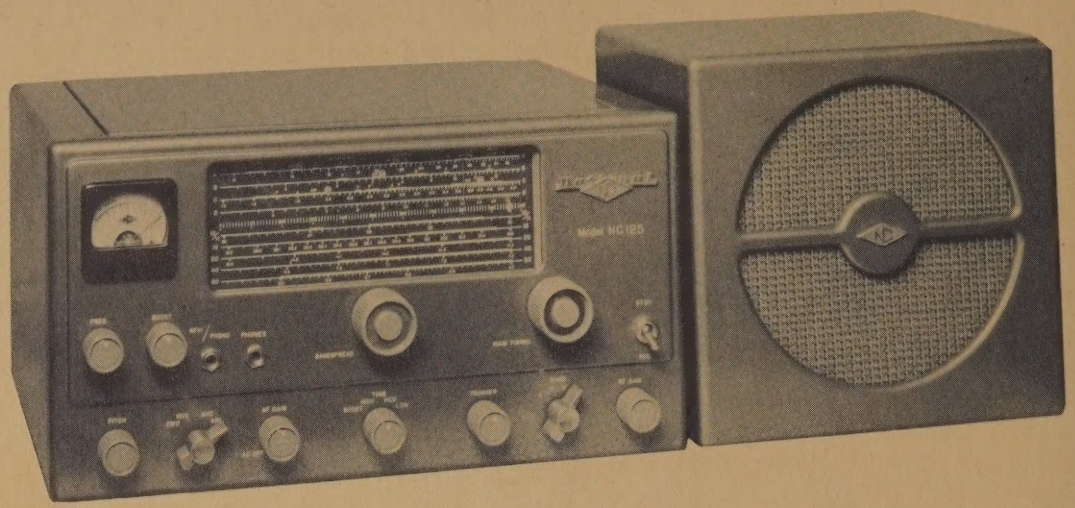
National

NC

EST. 1914

PRICE 50 CENTS

National



NC-125 RECEIVER

HIGHLIGHTS . . .

- Continuous Frequency Coverage of from 560 kilocycles to 35 megacycles.
- Direct Frequency Reading Slide-Rule Dial
- Calibrated Bandspread Tuning for 10-11, 15, 20, 40 and 80 Meter Amateur Bands
- Automatic Noise Limiter
- Built-In Select-O-Ject
- Accessory Connector Socket
- Stabilized Voltage Regulated Circuits
- R.F. Amplifier Stage with Panel Trimmer
- Two I.F. Amplifier Stages
- Separate Loudspeaker in Matching Cabinet

National Company, Inc.

SECTION I. DESCRIPTION

1-1. GENERAL

The NC-125 is a superheterodyne Radio Receiver having a complement of eleven tubes, including a rectifer and a voltage regulator tube, with a continuous frequency coverage of from 560 kilocycles to 35 megacycles. This Receiver is designed for the reception of amplitude modulated voice or music and code telegraph signals throughout its entire frequency range. A calibrated illuminated slide-rule dial provides direct reading scales in megacycles for each of the General Coverage ranges as well as additional calibrated bandspread scales for the 10, 11, 15, 20, 40 and 80 meter amateur bands. The selectivity characteristic is adjustable over a wide range from broad-band broadcast requirements to sharp amateur C.W. reception. This is accomplished by incorporating the well known Select-O-Ject variable audio frequency device in the Receiver circuit design. The adjustable selectivity plus high sensitivity assures the operator of optimum reception during adverse operating conditions.

The NC-125 employs a voltage regulator tube to minimize frequency drift in the high-frequency and beat-frequency oscillators. This assures a minimum of frequency drift for both phone and code reception. Other highlights include an accessory connector socket, separate loudspeaker in matching cabinet and a front-panel mounted S-meter. The separate bandspread control knob and linear logging dial scale makes possible fine, vernier-type tuning for any portion of the frequency spectrum covered by the Receiver. The usefulness of this feature will be outstanding on crowded bands such as the foreign broadcast band etc.

1-2. CIRCUIT

The stage outline of the circuit employed in the Receiver is given below together with the tube associated with each stage.

R.F. Amplifier	6SG7
High-Frequency Osc-Mixer	6SB7-Y
First I.F. Amplifier	6SG7
Second I.F. Amplifier	6SG7
Second Det.-A.V.C.-A.N.L.	6H6
Phase Shifter	6SL7GT
Boost-Reject Audio Amplifier	6SL7GT
First Audio Amplifier - C.W.O.	6SL7GT
Audio Output	6V6GT
Voltage Regulator	0A2
Rectifier	5Y3GT

1-3. TUNING SYSTEM

The three-gang main tuning capacitor, the panel-mounted Trimmer control and four set of coils are used to properly tune the frequency range of the Receiver in four General Coverage tuning bands as shown on the following table. The main tuning capacitor and the bandspread capacitor are connected in parallel on all bands. A slide-rule type dial with two separate pointers is utilized. One of these pointers is synchronized with the main tuning control and the other with the bandspread control. The General Coverage portion of the slide-rule dial has four scales accurately calibrated for direct reading in megacycles as follows:

BAND	FREQUENCY COVERAGE
A	12.0 - 35.0 Mc.
B	4.4 - 12.0 Mc.
C	1.55- 4.4 Mc.
D	0.56- 1.55 Mc.

It will be noted that Band D encompasses the entire Standard Broadcast Band. The respective scales are marked with heavy white scorings to clearly locate for the operator such short-wave features as the Amateur, Police, Ship Frequencies and Foreign Broadcast bands.. These locating markers are identified by letters AM, P, S and F, respectively.

The Amateur bands tuneable by the NC-125 are listed below with their band locations. Five accurately calibrated Bandspread scales are provided on the slide-rule dial for each of the specified Amateur bands.

BAND	AMATEUR BAND	FREQUENCY
A	10, 11	27.16 - 29.7 Mc.
A	15	21.0 - 21.5 Mc.
A	20	14.0 - 14.4 Mc.
B	40	7.0 - 7.3 Mc.
C	80	3.5 - 4.0 Mc.

1-4. AUDIO OUTPUT

Two audio output circuits are provided as follows:

(1) The Loudspeaker supplied with the NC-125 is of the permanent magnet field type and is mounted in a cabinet finished to match the Receiver. An output terminal strip is mounted at the rear of the Receiver for convenient connection of the Loudspeaker.

(2) A Phones jack is mounted on the front panel and is wired so as to silence the loudspeaker when headphones are used. The headphones load impedance is not critical permitting a wide range of headphones types, including crystal, to be used.

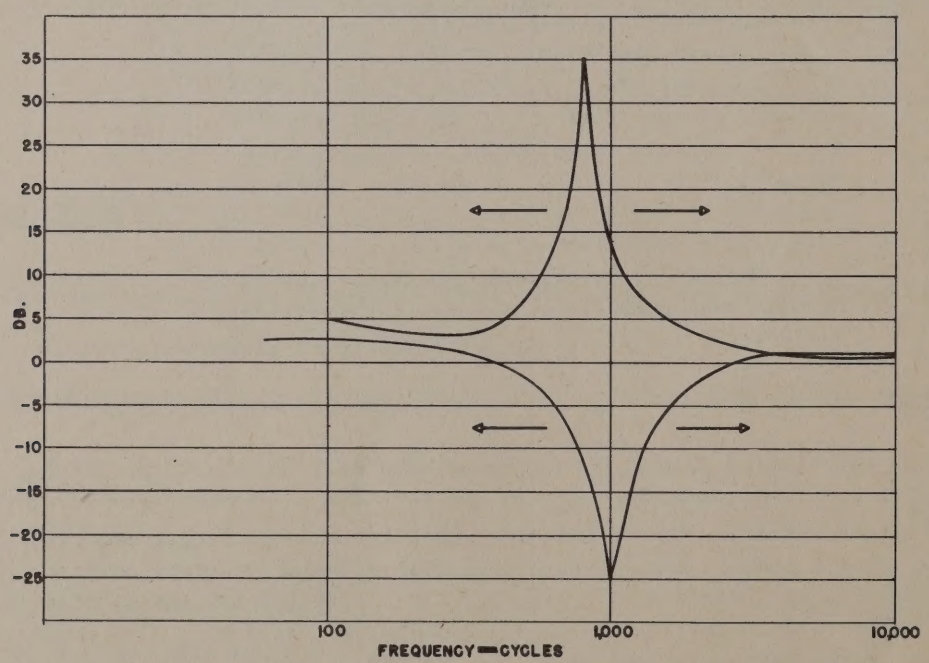


Figure No. 1. Select-O-Ject Circuit Characteristic

1-5. SELECT-O-JECT

The NC-125 Receiver incorporates a built-in Select-O-Ject audio frequency circuit. By proper adjustment of the front-panel mounted controls associated with this circuit any single frequency selected in the range of approximately 80 to 10,000 cycles may be boosted or rejected. Its

capabilities are graphically illustrated on Figure No. 1. In phone reception the Select-O-Ject may be used for the rejection of interfering heterodynes. In C.W. reception interfering signals may be rejected or, alternatively, the desired signal may be selected and amplified. In the reception or amplification of music, the Select-O-Ject may be used as an adjustable bass boost.

1-6. SIGNAL STRENGTH METER

Signal input readings are indicated in S-units from 1 to 9 in 5 db. steps and in db. above S-9 from 0 db. to 40 db. on the panel-mounted signal strength meter. The S-Meter employs a 0-1 milliampere movement and is connected in a bridge circuit. A variable resistor is placed in series with the meter to allow adjustment of the pointer to its electrical zero setting. The correct dial setting for any specific station on the dial is that setting which provides maximum deflection of the meter pointer.

1-7. POWER SUPPLY

The NC-125 Receiver is designed for operation from a 105/130 volt, 50/60 cps., A.C. source of supply. Normal power consumption is approximately 91 watts. The built-in power supply provides all voltages required by the heater and B supply circuits 2.85 amperes at 6.3 volts and 92 milliamperes at 250 volts, respectively.

The NC-125 is readily adaptable to battery operation and instructions for using batteries are given in detail in Section 2.

1-8. PHONO INPUT

A Phono input jack is mounted on the front panel and can be used to connect auxiliary apparatus, such as a record player pick-up or microphone into the audio system of the Receiver. This input circuit is of high impedance providing a suitable match for such external equipment into the first audio amplifier stage.

Most record players are terminated in a single shielded wire. As the Phono input jack on the Receiver is designed to accommodate a standard phone plug, it is necessary that this single shielded wire be attached to a phone plug. If the output circuit of the record player is of low impedance (less than 100,000 ohms) improved efficiency will be obtained if a suitable resistor with a value as specified for the particular record player, is connected across the phone plug to properly load the record player output circuit.

When a record player is used in conjunction with the Receiver the R.F. Gain control should be set at the extreme counterclockwise position. Both the A.F. Gain and Tone controls are operative with this type of operation.

1-9. ACCESSORY CONNECTOR SOCKET

A standard octal type socket is mounted at the rear of the Receiver to permit convenient connection of a narrow-band F.M. adaptor. Reception of narrow-band F.M. signals may be accomplished by plugging a National Model NFM-73B directly into the Accessory Socket and inserting the phone plug supplied with the unit into the Phono jack at the front of the Receiver. The drawing of the Accessory Connector Socket on the Schematic Diagram shows the various connections made to the pins of the socket and the voltages available. As will be noted B+ and filament voltages as well as I.F. output are available at this socket permitting the connection of auxiliary equipment. Consideration must be exercised to prevent loading any of these supplies beyond that for which they are designed.

SECTION 2. INSTALLATION

2-1. INSTALLATION PROCEDURE

Carefully unpack the Receiver from its packing crate and proceed as follows:

(1) Make sure A.C. jumper plug, P-1 (at rear of Receiver) and all tubes are seated firmly in their sockets

(2) Connect a good external ground to the terminal labeled G on the antenna strip at the rear of the Receiver. This connection is not absolutely required but in certain localities considerable reduction in interfering noise can be achieved by such a connection.

(3) Connect the antenna as recommended in Section 2-3.

(4) Connect the power cord, P-2, to a 105/130 volt, 50/60 cycle, A.C. source of supply.

(5) Set controls as recommended in Section 3 for the reception of signals.

NOTE

Where the Receiver is located in the field of a transmitting station, as would be the case when the NC-125 is used as the Receiver in a transmitting station, it is advisable to provide some means of preventing damage to the receiver antenna coil. If a separate receiving antenna is used, a means for disconnecting the antenna from the Receiver or grounding the antenna during transmission periods should be provided.

2-2. ARRANGEMENT

The Receiver and the Loudspeaker may be arranged in any desired position although it is not recommended that the Loudspeaker be placed on top of the Receiver as undesirable microphonics may result. Wherever practicable placement of the Receiver should be made to allow freedom of air circulation on all four sides.

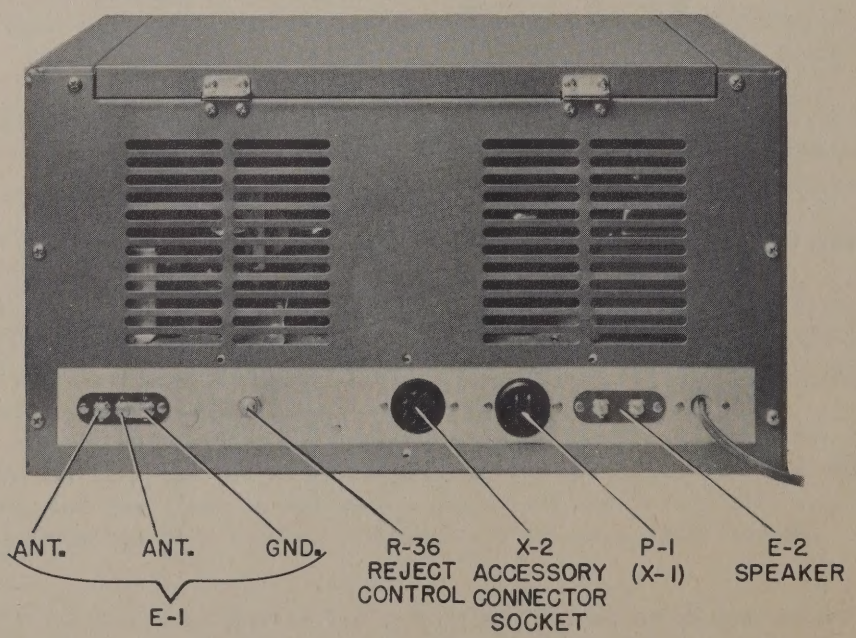


Figure No. 2. Rear View of Receiver

2-3. BATTERY OPERATION

The NC-125 Receiver is readily adaptable to portable or emergency service by connecting batteries to the terminals of the power socket, X-1, at the rear of the Receiver. The A.C. jumper plug, P-1, may be rewired for battery connection or if changeover operation is desired another octal plug should be obtained. Do not use the A.C. jumper plug, P-1, for battery operation without first removing the jumper wires. The battery plug used should be wired in accordance with the drawing shown on the schematic diagram. The voltage regulator tube should be removed during battery operation. A 6-volt heater supply (storage battery) should be connected to terminals 3 and 5 and 180 to 250 volt "B" supply connected to terminals 1 and 8. Current drain is approximately 72 milliamperes and 2.85 amperes at 180 and 6 volts, respectively. A suggested refinement is to include a switch in the A+ lead so that the tube heaters may be turned off when the Receiver is not in use without the necessity of removing the battery plug. The Standby-Receive switch on the Receiver is operative with battery operation the same as for A.C. operation. The A.C. line switch on the front panel does not render the Receiver inoperative during battery operation.

The recommendations of Section 3, Operation, apply to the battery powered NC-125.

2-4. ANTENNA RECOMMENDATIONS

The antenna input circuit of the Receiver is arranged for operation from either a single-wire type, doublet type antenna or other types having impedances of 70 ohms or more. The input impedance of the antenna circuit is approximately 300 ohms

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of 50 to 100 feet is recommended although the length is not critical and any length between 25 and 200 feet may be used. In installations where the Receiver is tuned to one frequency or a narrow-band of frequencies optimum results will be obtained by designing the antenna for the operating frequency. In an installation where the Receiver is to be used as the receiving unit in a transmitting station the most efficient operation will usually result from use of the transmitting antenna as a receiving antenna also. For switching the antenna from transmitter to receiver, an antenna changeover relay with good high frequency insulation is recommended.

The method of connecting the various types of antennae to the antenna terminal strip at the rear of the Receiver is as follows:

(1) Single-wire type -- Connect antenna to terminal A at the left of the strip and ground the unused A terminal by means of the metal link.

(2) Doublet type -- Connect the antenna feeders to the two terminals marked A; the metal link is not used.

(3) Concentric transmission line type -- Connect the inner conductor to terminal A at the left of the strip and the outer conductor to the other A terminal which, in turn, should be connected to the metal link.

SECTION 3. OPERATION

3-1. CONTROLS

This section on controls is presented prior to the actual operating instructions to give the operator of an NC-125 an understanding of the function of each control on the Receiver. All controls are clearly identified by front panel markings.

The R.F. Gain control adjusts the sensitivity (ability to receive weak and distant stations) of

the Receiver from a minimum at the extreme counterclockwise position of the knob to a maximum at the extreme clockwise position. This is accomplished by adjustment of the amplification of the R.F. and I.F. amplifier stages.

The Band switch has four positions and serves to select the band of frequencies to be tuned by the Receiver. The four positions are marked with identifying band designations which correspond to the markings which appear on the General Coverage portion of the slide-rule dial.

The Trimmer control operates a tuning capacitor trimmer which is connected across the first R.F. amplifier main tuning capacitor section. The trimmer control is used to tune the R.F. amplifier stage properly under a wide variety of antenna loading conditions.

The A.F. Gain - A.C. OFF control is a dual purpose type. In the A.C. OFF position the Receiver is turned off; when the control knob is turned clockwise the A.C. line switch is closed, thus turning on the Receiver. The other function of this control is to adjust the audio output volume of the Receiver. Audio volume is progressively increased to a maximum when the knob is turned to the extreme clockwise position.

The Control switch labeled C.W.O., M.V.C., A.V.C. and A.N.L. has four functions corresponding to the switch markings. In the A.V.C. position the automatic volume control circuit is switched into the circuit to compensate for fluctuating volume due to fading. In the A.N.L. position the automatic noise limiter is switched on to effectively reduce interference caused by static, automobile ignition noise etc. Limiting action automatically takes place at a relatively high percentage modulation. The automatic volume control circuit remains operative in the A.N.L. position of the control switch. The M.V.C. position disables the A.V.C., C.W.O. and A.N.L. circuits. The C.W.O. positions switches into the circuit the C.W. oscillator to permit reception of code telegraph signals.

The Pitch control is used in conjunction with the C.W.O. position of the control switch and has no effect on receiver performance with any other control switch setting. The Pitch control is used to adjust the beat note of the incoming code signal to an audio tone pleasing to the operator. The C.W. oscillator is tuned to the Receiver's intermediate frequency mid-scale on the control knob. The range of the Pitch control is approximately ±3,000 cycles.

The Tone switch is utilized as a combination Select-O-Ject and Tone control switch. In the Boost position the front-panel mounted Boost control is operative. As the boost control is advanced in a clockwise direction the circuit becomes more regenerative finally breaking into oscillation. For maximum boost of an incoming audio frequency, the Boost control should be set as closé as possible to the oscillation point without producing sustained oscillation. The Frequency control is used to select the audio frequency to be boosted.

In the High, Med. and Low positions of the switch the Reject control is operative. This is a screwdriver type adjustment located on the back of the chassis. The control has been pre-set at the factory so as to provide attenuation of any single undesired heterodyning audio frequency as selected by the Frequency control. Once adjusted at any one frequency the control need not be adjusted again for full maximum attenuation over the entire frequency control range. Further information on realignment of the Select-O-Ject controls are contained in Section 5. The Tone switch provides three positions of tonal value of the audio output amplifier as follows: Boost and High — normal Receiver reproduction in which an average tonal output is achieved; Med — reproduction in which the higher tones are moderately attenuated; Low -- in this position the higher tones are subdued emphasizing the lower tones.

The Standby-Receive switch is used to quiet the Receiver during transmission periods or other times when it is desirable to be able to resume reception immediately after a period of silence (i.e. not having to wait for the tubes to warm up). The Standby-Receive switch should not be used to shut off the Receiver. The Receiver should be turned off by turning the A.F. Gain control to A.C. OFF position. The function of the Standby-Receive switch may be duplicated at an external (remote) position by connecting a switch or relay to terminals 5 and 8 of the A.C. jumper plug (P-1).

This is a parallel arrangement permitting the panel-mounted Standby-Receive switch to remain operative.

The main tuning control knob and the calibrated General Coverage scales on the slide-rule dial are used to tune the frequency range of the Receiver. The band of frequencies tuned at any one time is determined by the Band switch setting. To maintain correct calibration when using the main tuning knob the Bandspread slide-rule pointer must be at the "Set" mark located at the top right-hand side of the bandspread scales.

The Bandspread control knob and the five bandspread slide-rule dial scales are used to spread out the five specified Amateur bands covered by the Receiver. Each of these five scales is accurately calibrated in megacycles. A logging scale with linear markings from 0 to 100 is positioned so as to be available for use with either the General Coverage or Bandspread dial pointers. When this scale is utilized with the Bandspread pointer any small portion of the Receiver frequency range may be spread out over a wide range. Bandspread Tuning is accomplished by setting the General Coverage tuning dial pointer at the high-frequency limit of the band of frequencies to be spread and rotating the Bandspread control to tune in the desired signal. The various "set points" are marked directly on the General Coverage dial scales at the upper frequency limit of the amateur band being tuned and are easily located by the identifying circular markers.

3-2. VOICE OR MUSIC RECEPTION

After the NC-125 Receiver is properly installed, as outlined in Section 2, it is placed in operation by adjusting the receiver controls as follows. These instructions are illustrated on Figure Number 3.

1. Set the Standby-Receive switch at Receive.

2. Turn the R.F. Gain control to the extreme clockwise position.

3. Set the Control switch at A.V.C.

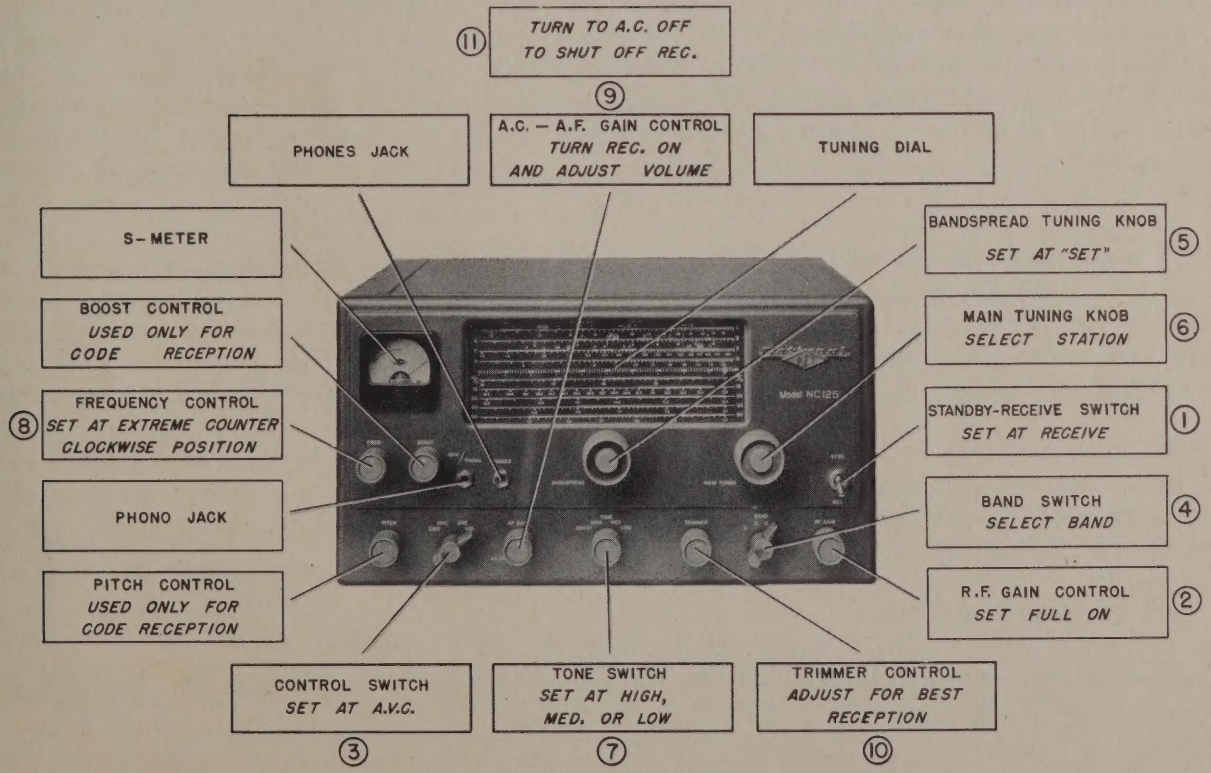

⑪ TURN TO A.C. OFF TO SHUT OFF REC.
⑨ A.C. — A.F. GAIN CONTROL TURN REC. ON AND ADJUST VOLUME
PHONES JACK
TUNING DIAL
S-METER
BANDSPREAD TUNING KNOB SET AT "SET" ⑤
BOOST CONTROL USED ONLY FOR CODE RECEPTION
MAIN TUNING KNOB SELECT STATION ⑥
⑧ FREQUENCY CONTROL SET AT EXTREME COUNTER CLOCKWISE POSITION
STANDBY-RECEIVE SWITCH SET AT RECEIVE ①
PHONO JACK
BAND SWITCH SELECT BAND ④
PITCH CONTROL USED ONLY FOR CODE RECEPTION
R.F. GAIN CONTROL SET FULL ON ②
CONTROL SWITCH SET AT A.V.C. ③
TONE SWITCH SET AT HIGH, MED. OR LOW ⑦
TRIMMER CONTROL ADJUST FOR BEST RECEPTION ⑩

Figure No. 3. Simplified Operating Instructions

4. Set the Band switch at the band of frequencies to be tuned. The standard broadcast band is band D.

5. Set the bandspread dial pointer at the "Set" mark.

6. Set the main tuning dial pointer at the desired frequency.

7. Turn the A.F. Gain - A.C. OFF control from the A.C. OFF position to the point providing the desired audio volume. Reset the main tuning dial pointer if necessary.

8. Set the Tone control switch at High, Med. or Low depending on the audio response desired. Set the Frequency control to the extreme counterclockwise limit of its rotation. The foregoing two settings render the boosting or rejecting effects of the Select-O-Ject circuit inoperative.

9. Adjust the Trimmer control for maximum response. Maximum response is clearly indicated by the S-Meter. The correct setting of the Trimmer control is indicated by maximum deflection of the S-Meter pointer. Alternately in the absence of a signal the Trimmer control may be set for maximum Receiver background noise.

The settings given above are for the reception of signals of average strength. An improvement in the reception of exceptionally weak signals or signals accompanied by interfering noise pulses may be realized by modification of the above settings.

For improvement in the reception of weak signals set the control switch at M.V.C. and modify the other control settings as follows:

1. Set the A.F. Gain control at approximately three-quarters rotation.

2. Adjust the audio volume by means of the R.F. Gain control.

When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, optimum noise-free reception will be had by setting the control switch at A.N.L. The resulting automatic limiting action will greatly reduce the interfering noise without noticeably affecting the signal. Best limiting action will be realized with the R.F. Gain control fully advanced; the audio volume should be adjusted by means of the A.F. Gain control. A further improvement in noise reduction will be realized by setting the Tone switch at Med. or Low depending on the degree of noise

In phone reception the built-in Select-O-Ject circuit furnishes a variable-frequency selective audio amplifier for the rejection of an interfering heterodyne. This is accomplished by setting the Tone switch in any position except that of Boost. Slowly adjust the Frequency control until a point of maximum attenuation of the undesired heterodyne is obtained. This rejection will be at the Frequency control setting which coincides with the audio frequency of the unwanted heterodyne.

The Boost position of the Tone switch is primarily intended for use in C.W. reception. However, in the reception or amplification of music the Boost and Frequency controls may be used to emphasize the bass output by setting the Tone switch at the Boost position and adjusting the Frequency control to obtain the desired bass boost.

3-3. CODE TELEGRAPHY RECEPTION

The adjustment of the receiver controls for code reception is the same as that for voice or music except for the following:

1. Set the control switch at C.W.O.

2. Set the A.F. Gain control at three-quarters rotation.

3. Adjust the audio volume by means of the R.F. Gain control.

4. Turning the Pitch control will change the characteristic pitch of the receiver background noise. This control enables the operator to vary at will the audio beat note of any C.W. signal to a preferred tone. The pitch will become higher as the beat frequency oscillator is detuned from the I.F. amplifier. The Pitch control is tuned to the I.F. frequency at the mid-point of the control's rotation (white dot at the top center). Turn the control to either side of zero beat until the characteristic pitch of receiver background noise is in the neighborhood of 2000 cycles. Under these conditions the audio beat note of any C.W. signal will show a broad peak at approximately 2000 cycles. This peak will appear on one side of the carrier only and on the other side the audio note will be considerably weaker. This characteristic, known as "single-signal", is helpful in receiving weak signals through interference.

For the reception of C.W. signals the action of the Select-O-Ject circuit is similar to that obtained in phone reception except that full use of the reject and boost capabilities of the circuit will be found very advantageous. Any desired degree of selectivity may be obtained by the adjustment of the Boost control from normal wide band reception to that of eliminating fundamental audio-frequency heterodynes Advancing the Boost control in a clockwise direction will increase the selectivity up to the point just below oscillation of the amplifier. At this point the selectivity obtained is very sharp and a ringing sound will accompany the tuned signal. The Frequency control is then used to select the single audio frequency to be boosted or rejected. Whether or not the audio frequency is boosted or rejected depends on the setting of the Tone switch. With the Tone switch in the Boost position the desired signal may be picked out and boosted. In all other positions of the Tone switch any single interfering signal or heterodyne may be rejected. An illustration of the characteristic curve of the Select-O-Ject performance is shown on Figure Number 1.

3-4. MEASUREMENT OF SIGNAL STRENGTH

The S-Meter in the NC-125 Receiver furnishes a means for the measurement of signal strength of incoming signals. To utilize the S-Meter the following control settings must be observed: R.F. Gain at 10, Control switch at A.V.C. or A.N.L. Adjust the R.F. Trimmer for maximum S-Meter reading of a particular incoming signal. The Tone, A.F. Gain, Boost or Frequency controls do not affect meter readings.

Tuning the Receiver to a signal will cause a meter deflection indicating the signal strength in S-Units or in decibels over the S-9 signal level. The correct dial setting for any specific station on the dial is that setting which provides maximum deflection of the meter pointer.

SECTION 4. MAINTENANCE AND TEST DATA

4-1. GENERAL MAINTENANCE DATA

The NC-125 is designed and constructed to assure a long period of uninterrupted service. A few service hints are given below to aid in locating individual components which, due to age or weakness, cause faulty operation of the Receiver.

Vacuum tube failure may be evidenced by reduction in sensitivity, intermittent operation or an inoperative Receiver. Tubes may be checked in suitable tube testing equipment or by replacement with tubes of proven quality. Care must be taken that tubes removed for checking are returned to their original sockets. Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind if replacement of the H.F. oscillator tube becomes necessary. A check of the dial calibration should be made if this tube is replaced to determine whether or not realignment is necessary.

Substitution of new I.F. amplifier or Select-O-Ject circuit tubes may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in Section 5.

In case of breakdown or failure of the Receiver, the fault must first be localized. This can often be accomplished by observation of some peculiar action of one of the controls. Reference to the circuit diagram will aid in checking voltages at the various tube elements. Measurement of voltages in accordance with Section 4-3 will most likely indicate where failure has occurred.

4-2. CIRCUIT FAILURES

All component parts in the NC-125 Receiver have been selected to assure an ample factor of safety. Failure may occur in individual cases and the most common cause of failure, excluding tubes, will probably be due to breakdown of a capacitor or resistor.

Bypass or filter capacitors which develop poor connections internally, or which become open-circuited, will cause decreased sensitivity, oscillation or poor stability. The defective unit can be located by temporarily connecting a good capacitor in parallel with each capacitor that is under suspicion.

Failure of any bypass or filter capacitor may seriously overload resistors in associated circuits. Overload of sufficient magnitude to permanently damage a resistor will cause the surface of the resistor to be scorched, making the defective component easy to locate by a good visual inspection.

Open or short-circuited resistors can be definitely located by measuring the resistance of each individual resistor. The schematic diagram should be consulted to make sure that any particular resistor under test is not connected in parallel with some other circuit element which might produce a false measurement.

Loose connections which cause intermittent or noisy operation can often be located by tapping or shaking any component under suspicion with the Receiver adjusted for normal operation.

4-3. VOLTAGE TABULATION

All voltage measurements should be made using a high-impedance vacuum tube voltmeter. Readings taken with any other type of instrument will vary somewhat depending upon the input resistance of the meter. Voltmeter resistance should be ten times larger than the resistance of the circuit across which the voltage is measured, otherwise the voltmeter will indicate a voltage lower than the actual voltage present. The tube socket voltage readings contained in the following table are tabulated using a high-impedance vacuum tube voltmeter with an input resistance of 11 megohms. The control settings to be observed are as follows:

(1) R.F. Gain control full on (extreme clockwise position).

(2) Frequency and Boost controls at the extreme counterclockwise position.

(3) Tone switch in High position.

(4) Control switch at M.V.C.

(5) Band switch at D and main tuning dial pointer set at high frequency limit on scale.

(6) A.F. Gain control full on (extreme clockwise position).

All voltages D.C. unless otherwise noted. Measured between specified terminal and chassis with a line voltage of 115-volts.

VOLTAGE TABLE

Tube	Pin No. 1	2	3	4	5	6	7	8
V-1, 6SG7	–	0	2.25	-.1	2.25	130	6.3 AC	210
V-2, 6SB7-Y	0	6.3 AC	240	90	-10	0	0	–
V-3, 6SG7	–	0	1.8	-.1	1.8	85	6.3 AC	240
V-4, 6SG7	–	0	2	-.1	2	120	6.3 AC	240
V-5, 6H6	–	0	-.4	-.4	-.6	0	6.3 AC	0
V-6, 6SL7GT	0	120	1.35	1.35	120	2.8	6.3 AC	0
V-7, 6SL7GT	2.5	115	3.9	2.9	115	4	6.3 AC	0
V-8, 6SL7GT	0	96	2.2	0	125	1.0	0	6.3 AC
V-9, 6V6GT	0	6.3 AC	235	250	0	–	0	13
V-10, 0A2	–	0	–	–	150	–	–	–
V-11, 5Y3GT	–	280	–	250 AC	–	250 AC	–	280

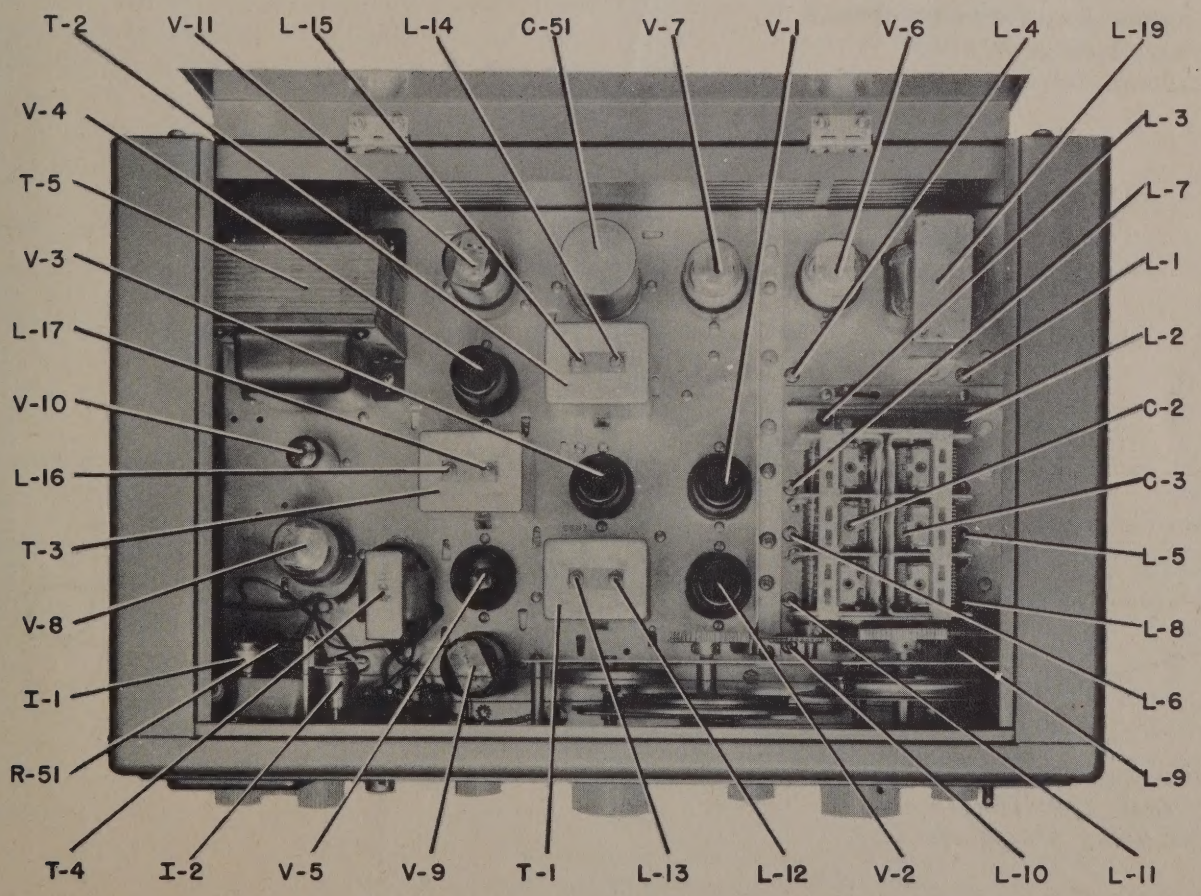
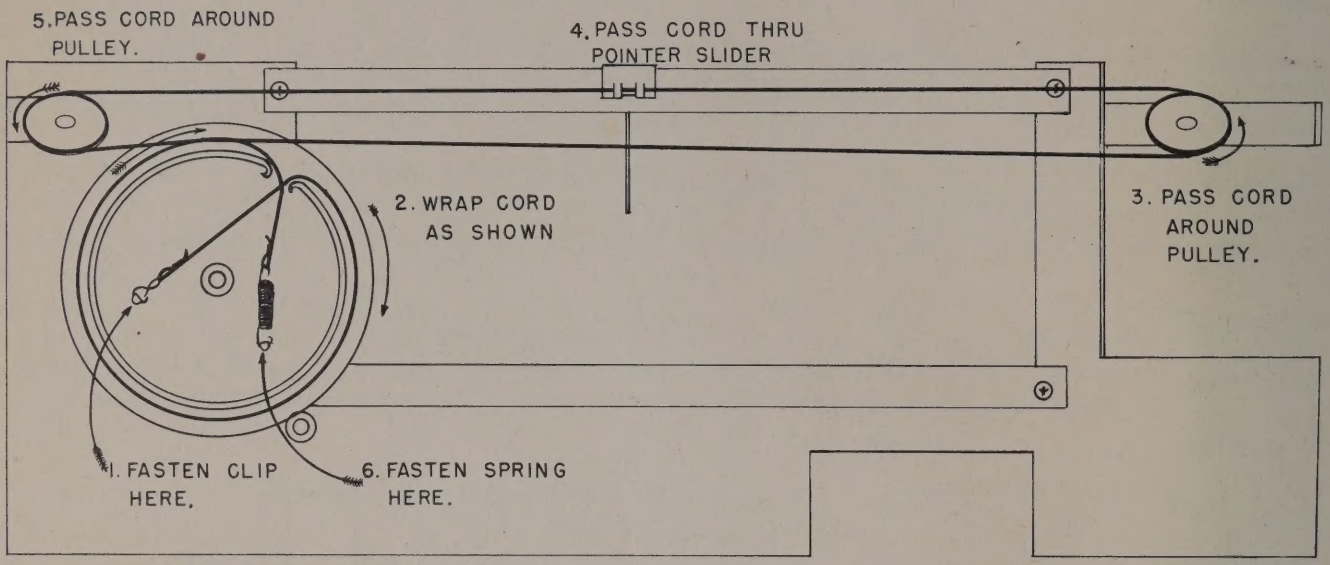


Figure No. 4. Top View of Receiver

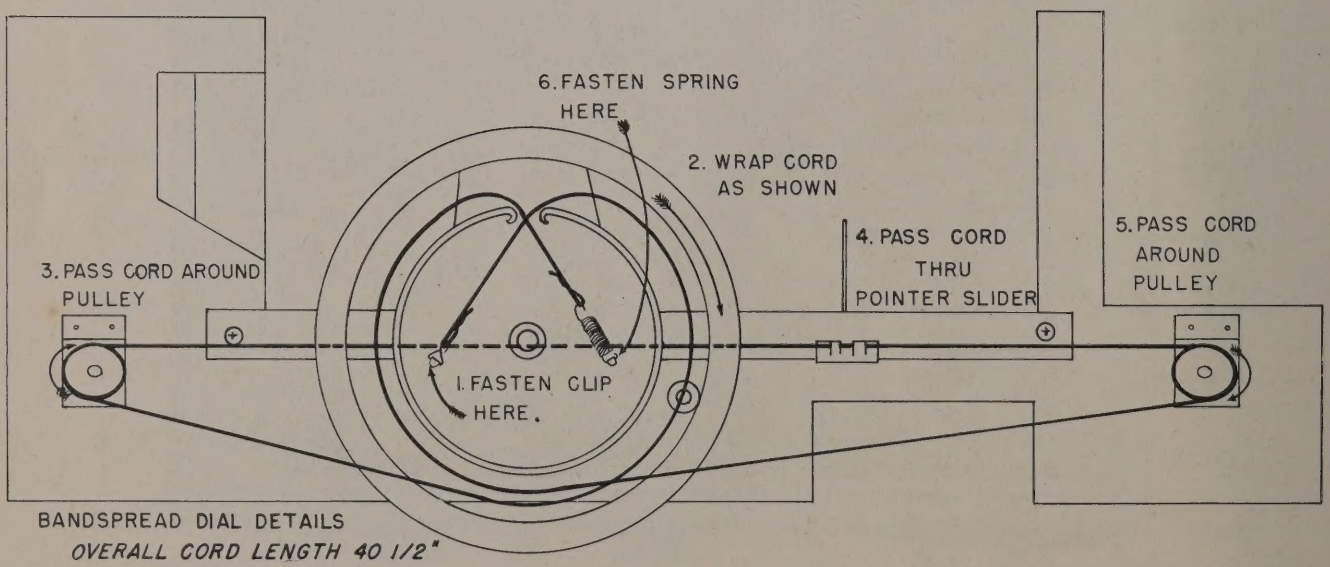
4-4. SLIDE-RULE TUNING DIAL

The cord used in the dial drives is especially selected for its long life properties. If replacement should become necessary refer to Figure No. 5 for stringing instructions.


5. PASS CORD AROUND PULLEY.
4. PASS CORD THRU POINTER SLIDER
2. WRAP CORD AS SHOWN
3. PASS CORD AROUND PULLEY.
1. FASTEN CLIP HERE.
6. FASTEN SPRING HERE.

MAIN TUNING DIAL STRINGING DETAILS
OVERALL CORD LENGTH 43"
INCLUDING SPRING AND CLIP

NOTE: Both cords are shown exposed for clarity.


6. FASTEN SPRING HERE
2. WRAP CORD AS SHOWN
4. PASS CORD THRU POINTER SLIDER
5. PASS CORD AROUND PULLEY
3. PASS CORD AROUND PULLEY
1. FASTEN CLIP HERE.

BANDSPREAD DIAL DETAILS
OVERALL CORD LENGTH 40 1/2"
INCLUDING SPRING AND CLIP

Figure No. 5. Dial Stringing Instructions

SECTION 5. ALIGNMENT

5-1. GENERAL

All circuits of the NC-125 have been carefully aligned before shipment using precision test equipment insuring accurate conformability to the alignment frequency. No realignment will be required unless the Receiver is tampered with or component parts or tube replacements have been necessary.

The necessity for any realignment may be determined by checking the performance of the Receiver, as outlined in Section 3, and the dial calibration. It is recommended that, if tests indicate realignment is required, the instructions given in this section should be thoroughly read and understood before alignment is attempted

Complete alignment of the Receiver can be divided into two steps as follows:

1. Intermediate - Frequency Amplifier Alignment.
2. General Coverage Alignment:
   (a) High-Frequency Oscillator
   (b) First Detector and R.F. Amplifier

All circuits must be tuned in the above order when complete alignment is required. All alignment adjustments and controls are shown on Figure Numbers 4, 6, 7 and 8.

5-2. I.F. AMPLIFIER ALIGNMENT

The intermediate frequency of the NC-125 Receiver is 455 kilocycles. The two I.F. transformers, C.W.O. transformer and the second detector input transformer have permeability tuned iron-core inductors with trim-screw adjustments for alignment purposes. These adjustments are accessible from the top inside of the cabinet as shown on Figure Number 4.

The alignment procedure is as follows:

1. Connect an output meter having an 8-ohm resistive load to the matching output terminals on the Receiver. Alternately this output meter may be plugged into the phones jack.
2. Connect the high output lead of an accurately calibrated signal generator to the stator of the detector portion of the main tuning capacitor, C-2B, and the ground lead to any convenient point on the chassis. This is a direct connection. Set the signal generator at 455 kilocycles and turn the modulation on.
3. Set the Control switch at M.V.C.
4. Set the R.F. Gain control full on (extreme clockwise position).
5. Set the Frequency control at the extreme counterclockwise position.
6. Set the Tone switch at High.
7. Set the A.F. Gain control full on (extreme clockwise position).
8. Adjust the output attenuator of the signal generator to provide a signal of approximately 100 microvolts. While making I.F. amplifier adjustments, it will be necessary to retard the attenuator of the signal generator as I.F. amplifier gain increases to a point where overload occurs.
9. Adjust the I.F. tuned inductors, L-12 through L-17 inclusive, for maximum gain, as indicated on the output meter. The order in which these adjustments are made is not important.

At the conclusion of the I.F. amplifier alignment the tuning of the C.W. oscillator may be checked by turning the modulation of the signal generator off and setting the control switch at C.W.O. With this setting zero beat of the test signal should occur with the Pitch control set at mid-scale. If the above test indicates realignment of the C.W. oscillator is required proceed as follows:

1. Remove the bottom cover of the Receiver.

2. Loosen the set screw on the collar of the C.W. oscillator transformer shaft.

3. Without loosening the Pitch control knob on its shaft withdraw the knob and shaft from the cabinet.

4. The screw driver adjustment on the C.W. oscillator inductor L-18 will then be accessible through the shaft opening in the cabinet. Adjust L-18 for zero beat with the test signal.

5. Replace the Pitch control knob and shaft so that the white dot on the knob is at mid-scale.

6. Position the collar so that the set screw is directly opposite (180^{o}) from the stop and tighten the set screw making sure that the position of the Pitch control knob does not change from mid-scale.

5-3. GENERAL COVERAGE ALIGNMENT

General coverage alignment and bandspread alignment are accomplished simultaneously, since the main tuning and bandspread tuning capacitors are connected in parallel on all bands. The Receiver should be set up as specified in Section 2-1 except that the antenna should be disconnected. Adjustment of the H.F. oscillator and first detector trimmers can be made through the holes in the bottom cover of the Receiver after removal of the small cover plate. See Figure No. 6. Some inductor adjustments are accessible from the top inside of the cabinet: all except L-11 and L-7 from the bottom of chassis. Adjustments on top of the chassis are made using the trim screws, adjustments on the bottom are made using the slotted iron cores. The preliminary alignment procedure is as follows:

1. Connect an output meter having a 8-ohm resistive load to the output terminal panel on the Receiver.

2. Connect an accurate signal source (signal generator or crystal-controlled test oscillators) to the antenna input terminals through a standard dummy antenna of 300 ohms.

3. Set the Control switch at M.V.C.

4. Set the R.F. Gain control full on.

5. Set the Frequency control at the extreme counterclockwise limit of rotation.

6. Set the Tone switch at High.

7. Set the A.F. Gain control to provide a suitable output level.

8. Set the Bandspread and General Coverage slide-rule dial pointers as shown in the Alignment Table contained in this section.

The complete procedure for alignment of the high-frequency oscillator, first detector and R.F. amplifier stage is outlined in a step by step manner on the Alignment Table. The sequence of steps should be strictly adhered to.

Particular care must be taken when adjusting the high frequency oscillator trimmers. It is imperative that the oscillator is aligned to the fundamental frequency and not the image. This can be checked by tuning in the image frequency of the test signal. On the A Band the image should appear 910 kilocycles above the fundamental signal. On the B, C, and D bands the image should appear 910 kilocycles below the fundamental signal. If the image does not appear at its correct setting the high-frequency oscillator trimmer must be adjusted until the image and fundamental signals appear at the proper points on the dial.

ALIGNMENT TABLE

Step	Band	Adjust Signal Source To:	Set Main Tun. Pointer At:	Set Bandspread Pointer At:	Adjust To Receive Test Signal	Adjust for Maximum Output
1	A	34.0 Mc.	34.0 Mc.	Set	C-18	C-12, C-5
2	A	12.0 Mc	12.0 Mc	Set	L-8	L-20#*, L-1
3	A	34.0 Mc.	34.0 Mc.	Set		Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	B	12.0 Mc	12.0 Mc.	Set	C-20	C-14, C-5
2	B	4.4 Mc.	4.4 Mc.	Set	L-9	L-5, L-2
3	B	12.0 Mc.	12.0 Mc.	Set		Check Step 1. Repeat Step 1, 2 and 3 if necessary.
1	C	4.4 Mc.	4.4 Mc.	Set	C-22	C-15, C-5
2	C	1.6 Mc.	1.6 Mc.	Set	L-10	L-6*, L-3
3	C	4.4 Mc.	4.4 Mc.	Set		Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	D	0.6 Mc.	0.6 Mc.	Zerp	L-11**	L-7**, L-4
2	D	1.5 Mc.	1.5 Mc.	Set	C-24	C-16, C-5
3	D	0.6 Mc.	0.6 Mc.	Set		Check Step 1. Repeat Steps 1, 2 and 3 if necessary.

#Loop inside coil form for adjustment.
*Accessible only from bottom of chassis.
**Accessible only from top of chassis.

5-4. SELECT-O-JECT CIRCUIT ALIGNMENT

The Select-O-Ject circuit has been pre-set at the factory to provide optimum operating efficiency. If the Reject control has been tampered with or a tube or component part replacement has been made, readjustment may be necessary. This is accomplished in the following manner:

1. Set up the receiver for normal operation as outlined in Section 3.
2. Set the TONE control at either the High, Medium or Low position.
3. Connect a signal generator to the antenna input terminals on a frequency of 1000 kc. with the modulation set to the 400 cycle position.
4. Set the REJECT control on the rear of the chassis for maximum rejection of the 400 cycle note.

5. Set the FREQUENCY control on the front of the panel for a finer rejection of the 400 cycle signal. This adjustment is critical and should be carefully adjusted.

6. Simultaneously adjust both controls for maximum rejection of the 400 cycle note.

5-5. S. METER ADJUSTMENT

Two adjustments are provided to assure correct operation of the S-Meter; one mechanical and the other electrical.

1. Mechanical -- With the Receiver turned off, the meter pointer should read 40 db. (the last scale marking). If it does not, correction is effected by the screw adjustment on the front of the meter.

2. Electrical -- With the Receiver turned on and controls adjusted for meter operation, the meter pointer should read zero (the first scale marking). This test must be made with no signal input to the Receiver. Correction of the zero setting, if required, is made by means of the S-Meter balancing resistor, R-51. This is a screwdriver type adjustment whose location is shown on Figure Number 4.

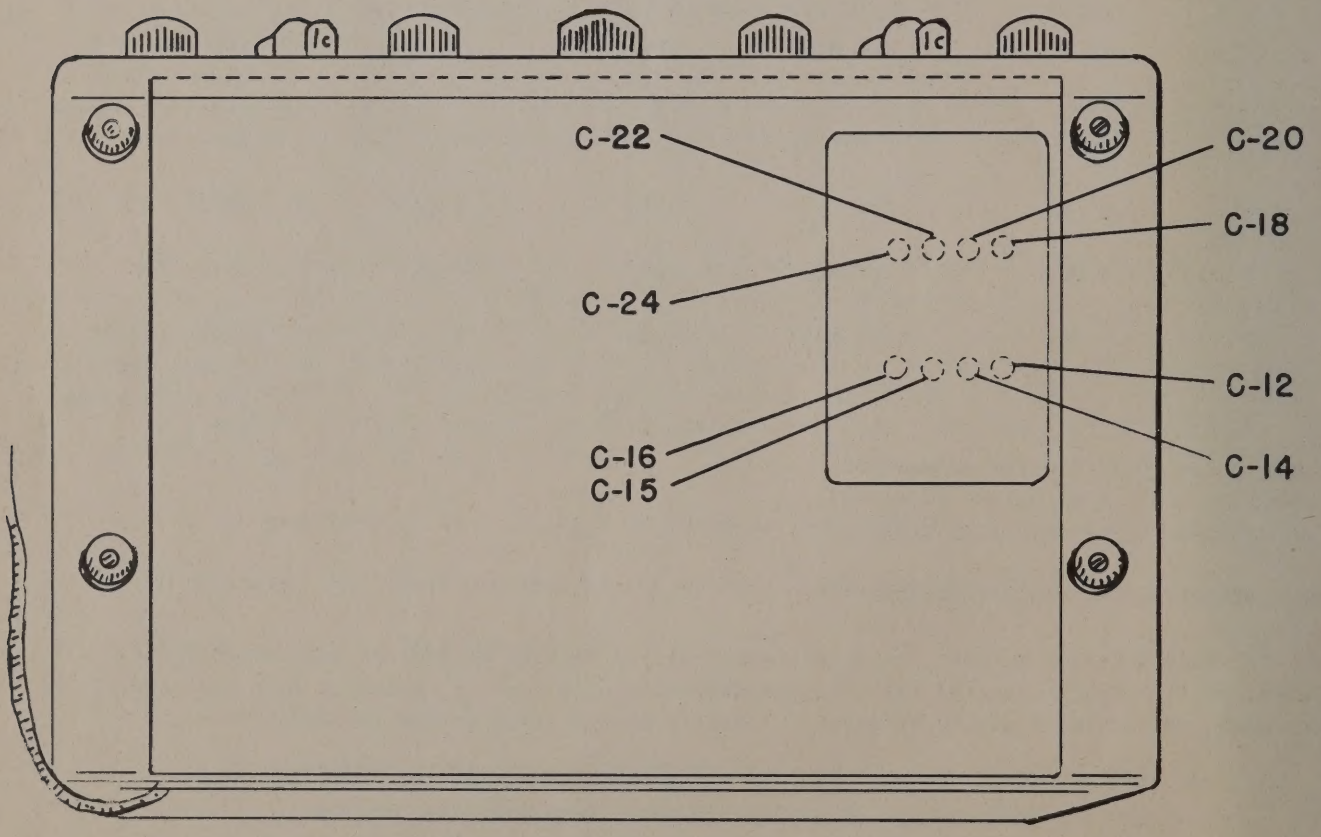


Figure No. 6. R.F. Alignment Trimmer Locations

PARTS LIST

Symbol	Description	Nat. Co. Type
	CAPACITORS	
C-1	Paper .01 mfd 400 vdcw	D827-5
C-2	Air variable 2 section	SA:8102
C-2A	10-25 mmf bandspread	Part of C-2
C-2B	10-25 mmf bandspread	Part of C-2
C-2C	10-25 mmf bandspread	Part of C-2
C-3A	10-441.7 mmf main tuning	Part of C-2
C-3B	10-441.7 mmf main tuning	Part of C-2
C-3C	10-441.7 mmf main tuning	Part of C-2
C-4	Not used	
C-5	Variable air 3-40 mmf	SA:9988
C-6	Mica 1000 mmf 500 vdcw	J665-71
C-7	Paper .01 mfd 400 vdcw	D827-5
C-8	Paper .01 mfd 400 vdcw	D827-5
C-9	Mica .001 mfd 300 vdcw	J665-71
C-10	Not used	
C-11	Ceramic 15 mmf 500 vdcw	D825D-405
C-12	Variable mica 1.8-40 mmf	D832-3
C-13	Ceramic 5 mmf 500 vdcw	D825D-401
C-14	Variable mica 1.8-40 mmf	D832-3
C-15	Variable mica 1.8-40 mmf	D832-3
C-16	Variable mica 1.8-40 mmf	D832-3
C-17	Not used	
C-18	Variable ceramic 5-20 mmf	E311-2
C-19	Mica .0043 mfd 500 vdcw	J666-37
C-20	Variable ceramic 5-20 mmf	E311-2
C-21	Mica .0013 mfd ±5% 500 vdcw	J666-18
C-22	Variable ceramic 5-20 mmf	E311-2
C-23	Mica 510 mmf 500 vdcw	H500-5
C-24	Variable ceramic 5-20 mmf	E311-2
C-25	Ceramic 10 mmf 500 vdcw	D825D-402
C-26	Dry electrolytic 20 mfd 450 vdcw	E338-3
C-27	Mica 100 mmf 500 vdcw	J665-32
C-28	Paper .01 mfd 400 vdcw	D827-5
C-29	Mica 510 mmf 500 vdcw	H500-5
C-30	Mica 510 mmf 500 vdcw	H500-5
C-31	Paper .01 mfd 400 vdcw	D827-5
C-32	Paper .01 mfd 400 vdcw	D827-5
C-33	Paper .1 mfd 400 vdcw	D827-12
C-34	Paper .1 mfd 400 vdcw	D827-12
C-35	Paper .01 mfd 400 vdcw	D827-5
C-36	Mica 510 mmf 500 vdcw	H500-5
C-37	Mica 510 mmf 500 vdcw	H500-5
C-38	Paper .01 mfd 400 vdcw	D827-5
C-39	Paper .01 mfd 400 vdcw	D827-5

Symbol	Description	Nat. Co. Type
	CAPACITORS (CONT'D)	
C-40	Paper .1 mfd 400 vdcw	D827-12
C-41	Paper .01 mfd 400 vdcw	D827-5
C-42	Mica 510 mmf 500 vdcw	H500-5
C-43	Mica 510 mmf 500 vdcw	H500-5
C-44	Mica 100 mmf 500 vdcw	J665-32
C-45	Paper .1 mfd 400 vdcw	D827-12
C-46	Paper .01 mfd 400 vdcw	D827-5
C-47	Paper .01 mfd 400 vdcw	D827-5
C-48	Paper .05 mfd 400 vdcw	D827-1
C-49	Paper .05 mfd 400 vdcw	D827-1
C-50	Mica .001 mfd 500 vdcw	J666-14
C-51	Dry electrolytic 450 vdcw	K945-1
C-51A	40 mfd	Part of C-51
C-51B	40 mfd	Part of C-51
C-52	Mica .001 mfd 500 vdcw	J666-14
C-53	Paper .05 mfd 400 vdcw	D827-1
C-54	Paper .05 mfd 400 vdcw	D827-1
C-55	Paper .05 mfd 400 vdcw	D827-1
C-56	Dry electrolytic 10 mfd 50 vdcw	E338-9
C-57	Mica 270 mmf 500 vdcw	J665-47
C-58	Paper .01 mfd 400 vdcw	D827-5
C-59	Mica 220 mmf 500 vdcw	H500-21
C-60	Paper .001 mfd 500 vdcw	D827-32
C-61	Dry electrolytic 25 mfd 50 vdcw	E338-4
C-62	Paper .02 mfd 600 vdcw	D827-44
C-63	Paper .01 mfd 400 vdcw	D827-5
C-64	Paper .01 mfd 400 vdcw	D827-5
	RESISTORS	
R-1	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-2	Fixed 150,000 ohms 1/2 watt	J569-51
R-3	Fixed 220 ohms 1/2 watt	J569-17
R-4	Variable wire wound 10,000 ohms	K349-1
R-5	Fixed 150,000 ohms 1/2 watt	J569-51
R-6	Fixed 1000 ohms 1/2 watt	J569-25
R-7	Fixed 4700 ohms 1/2 watt	J569-33
R-8	Fixed 33 ohms 1/2 watt	J569-7
R-9	Fixed 22,000 ohms 1/2 watt	J569-41
R-10	Fixed 3900 ohms 1/2 watt	J569-32
R-11	Fixed 1000 ohms 1/2 watt	J569-25
R-12	Fixed 470,000 ohms 1/2 watt	J569-57
R-13	Fixed 330 to 2200 ohms 1/2 watt	
R-14	Fixed 150,000 ohms 1 watt	J571-51
R-15	Fixed 1000 ohms 1/2 watt	J569-25

PARTS LIST

Symbol	Description	Nat. Co. Type
	RESISTORS (CONT'D)	
R-16	Fixed 470,000 ohms 1/2 watt	J569-57
R-17	Fixed 220 ohms 1/2 watt	J569-17
R-18	Fixed 2,200 ohms 1/2 watt	J569-29
R-19	Fixed 2,200,000 ohms 1/2 watt	J569-65
R-20	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-21	Fixed 100,000 ohms 1/2 watt	J569-49
R-22	Fixed 33,000 ohms 1/2 watt	J569-43
R-23	Fixed 10,000 ohms 1/2 watt	J569-37
R-24	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-25	Fixed 330,000 ohms 1/2 watt	J569-55
R-26	Fixed 1,000,000 ohms 1/2 watt	J569-61
R-27*	Fixed 1800 ohms	
R-28*	Fixed 1800 ohms	
R-29	Variable dual control	M879-2
R-29A	2,500,000 ohms	Part of R-29
R-29B	2,500,000 ohms	Part of R-29
R-30	Fixed 10,000 ohms 1/2 watt	J569-37
R-31**	Fixed 3900 ohms	
R-32**	Fixed 3900 ohms	
R-33	Fixed 10,000 ohms 1/2 watt	J569-37
R-34	Fixed 22,000 ohms 1/2 watt	J569-41
R-35	Variable 500,000 ohms	J533-9
R-36	Variable 500,000 ohms screw-driver control	J533-7
R-37	Fixed 5600 ohms 1/2 watt	J569-34
R-38	Fixed 22,000 ohms 1/2 watt	J569-41
R-39	Fixed 22,000 ohms 1/2 watt	J569-41
R-40	Fixed 1800 ohms 1/2 watt	J569-28
R-41	Fixed 3300 ohms 1/2 watt	J569-31
R-42	Variable with switch 500,000 ohms	K347-1
R-43	Fixed 100,000 ohms 1/2 watt	J569-49
R-44	Fixed 2700 ohms 1/2 watt	J569-30
R-45	Fixed 22,000 ohms 1/2 watt	J569-41
R-46	Fixed 470,000 ohms 1/2 watt	J569-57
R-47	Fixed 330 ohms 2 watt	J572-19
R-48	Fixed 47,000 ohms 1/2 watt	J569-45
R-49	Fixed 33,000 ohms 1/2 watt	J569-43
R-50	Fixed 330 ohms 1/2 watt	J569-19
R-51	Variable 1000 ohms 1/2 watt	D831-2
R-52	Fixed 3900 ohms 10 watt	E959-12
R-53	Fixed 180,000 ohms 1/2 watt	J569-52
R-54	Fixed wire wound 4.3 ohms 1 watt	K098-48
R-55	Fixed 22 ohms 1/2 watt	J569-5

*Must be paired within 2% of each other

**Must be paired within 2% of each other

Symbol	Description	Nat. Co. Type
	MISCELLANEOUS	
E-1	Terminal board: antenna 3 terminal	E261-3
E-2	Terminal board: speaker 2 terminal	E265-8
I-1	Lamp: bayonet type, #47 6-8 volts - .15 amps	F136-11
I-2	Lamp: bayonet type #47 6-8 volts - .15 amps	F136-11
I-3	Lamp: bayonet type, #47 6-8 volts - .15 amps	F136-11
J-1	Phone jack: midget type closed circuit	K314-1
J-2	Phone jack: midget type closed circuit	K314-1
L-1	Inductor, RF for 'A' band, variable iron core	SA:4863
L-2	Inductor, RF: for 'B' band, variable iron core	SA:4867
L-3	Inductor, RF: for 'C' band, variable iron core	SA:4665
L-4	Inductor, RF: for 'D' band, variable iron core	SA:4666
L-5	Inductor, RF: for 'B' band, variable iron core	SA:4872
L-6	Inductor, RF: for 'C' band, variable iron core	SA:4873
L-7	Inductor, RF: for 'D' band, variable iron core	SA:4874
L-8	Inductor, RF: for 'A' band, variable iron core	SA:4866
L-9	Inductor, RF: for 'B' band, variable iron core	SA:4868
L-10	Inductor, RF: for 'C' band, variable iron core	SA:4658
L-11	Inductor, RF: for 'D' band, variable iron core	SA:4871
L-12	Inductor, IF: T-1 primary, variable iron core	SA:3366
L-13	Inductor, IF: T-1 secondary, variable iron core	SA:4537
L-14	Inductor, IF: T-2 primary, variable iron core	SA:3366
L-15	Inductor, IF: T-2 secondary, variable iron core	SA:3905
L-16	Inductor, IF: T-3 primary, variable iron core	SA:3366
L-17	Inductor, IF: T-3 secondary, variable iron core	SA:3905
L-18	Inductor, BFO: variable brass core	SA:5361

PARTS LIST

Symbol	Description	Nat. Co. Type
	MISCELLANEOUS (CONT'D)	
L-19	Choke: iron core, 120 cycles 10 henries, 100 ma, 300 ohms	K317-1
L-20	Inductor RF: variable iron core, 'A' band	SA:4870
M-1	Meter: illuminated, 0-1 milliampere range	J984-3
P-1	Plug, 8 prong with 2 jumpers	SA:3731
S-1	Switch: band selector; wafer type	K752-1
S-1A	Part of S-1; single pole 4 pos	
S-1B	Part of S-1; single pole 4 pos	
S-2	Switch: band selector; wafer type	K752-1
S-2A	Part of S-2; single pole 4 pos	
S-2B	Part of S-2; single pole 4 pos	
S-3	Switch: band selector; wafer type	K752-1
S-3A	Part of S-3; single pole 4 pos	
S-3B	Part of S-3; single pole 4 pos	
S-4	Switch: AVC, ANL wafer type, 4 pole, 4 pos	SA:7622
S-4A	Part of S-4; single pole 4 pos	
S-4B	Part of S-4; single pole 4 pos	
S-4C	Part of S-4; single pole 4 pos	
S-4D	Part of S-4; single pole 4 pos	
S-5	Switch: tone selector; wafer type	SA:7621
S-5A	Part of S-5; single pole 4 pos	
S-5B	Part of S-5; single pole 4 pos	
S-6	Switch: SPST	Part of R-42
S-7	Switch: single pole single throw toggle	E230-2
T-1	Transformer: IF; 455 kc, single primary double secondary shielded	SA:4875
T-2	Transformer: IF; 455 kc single primary and secondary shielded	SA:4533
T-3	Transformer: IF; 455 kc single primary and secondary shielded	SA:4533
T-4	Transformer: audio output, unshielded, 5000 ohms primary 3.2 ohms secondary	K313-1

Symbol	Description	Nat. Co. Type
	MISCELLANEOUS (CONT'D)	
T-5	Transformer: power, 115 v 60 cycles AC primary voltage 300 v at 100 ma, 5 v at 2 amps, 6.3 v at 3.0 amps secondary	K316-2
V-1	Tube, electron, semi variable mhu pentode, octal type 6SG7	
V-2	Tube; electron, pentagrid converter, octal type 6SB7	
V-3	Tube; electron, semi variable mhu pentode, octal type 6SG7	
V-4	Tube; electron , semi variable-mhu pentode octal type 6SG7	
V-5	Tube; electron, twin diode, octal type 6H6	
V-6	Tube; electron, double triode, octal type 6SL7GT	
V-7	Tube; electron, double triode, octal type 6SL7GT	
V-8	Tube: electron, double triode, octal type 6SL7GT	
V-9	Tube: electron, beam pentode, octal type 6V6GT	
V-10	Tube; electron, glow discharge diode miniature type 0A2	
V-11	Tube; electron, double diode, octal type 5Y3GT	
X-1	Socket, octal type	K235-1
X-2	Socket, octal type	K235-1

MECHANICAL PARTS	
Angle, 8 1/2 inches long top of chassis	P702-1
Angle, for cover (2)	K788-1
Angle, 4 1/8 inches long top of chassis	P703-1
Angle, mounted on bottom sides of chassis (2)	K259-1
Bracket, to hold trimmers in oscillator compartment	K584-1
Back for cabinet	K247-3
Bumper, for cover (2)	L180-1
Bottom, for cabinet	K234-4
Bracket, supports drive mechanism (2)	P730-1
Board, backing for drive mechanism	P722-1
Chassis, less components	SA:8101
Holder, coil form (12)	K582-2
Core, iron; for bandswitch coils (10)	H408-7
Core, brass; for oscillator coil	K782-1

MECHANICAL PARTS

Description	Nat. Co. Type
Compartment, oscillator; complete with coils and parts	SA:7598
Compartment, RF: complete with coils and parts	SA:7600
Compartment, mixer, complete with coils and parts	SA:7599
Cabinet welded wraparound, less jacks switch and meter	SA:8114
Cover, for cabinet	K239-3
Coupling for shafts (2)	SA:5277
Channel for dial	P718-1
Cord, for Bandspread dial	SA:8112
Cord, for Main Tuning dial	SA:8113
Detent, for band change switch	Q403-1
Drive mechanism for main tuning capacitor complete	SA:8103
Dial	P719-1
Foot, felt (4)	E293-3
Flywheel on drive shaft	SA:8108
Grommet, rubber	E923-11
Hinge, (2)	J825-2
Insulator, ceramic standoff	B425-1
Lug, one ground terminal and one eyelet to the left	D947-1
Lug, one ground terminal and one eyelet to the right	D947-2
Lug, one eyelet on ground terminal and one to the left	D947-3
Lug, one eyelet to either side of ground terminal (2)	D947-4
Lug, one ground terminal and 2 eyelets to the left (2)	D947-7
Lug, one ground terminal, one eyelet to the left and two to the right	D947-9
Lug, one eyelet on ground terminal and one to the right	D947-12
.ug, one eyelet on ground terminal 2 to the left and 1 to the right	D947-14
Lug, one eyelet on ground terminal, 2 to the left and 2 to the right	D947-18
Lock, for power cord	K172-1
Lug, ground (3)	E903-1
Lug, ground (10)	F774-1
Plug, button type, rear of chassis	F190-28
Plate, for mounting electrolytic capacitor	K042-1
Plate, cover 5 1/2" x3"	K593-1
Plate, front of set	SA:8104
Plate for rear of Drive mechanism	SA:8110

Description	Nat. Co. Type
Pointer, dial	P729-1
Socket, (8) molded (black)	J625-1
Socket, (4) mica filled bakelite (yellow)	J625-2
Socket, (1) miniature bakelite	M575-1
Shield, metal bracket for oscillator and mixer sections	SA:4879
Shield, metal bracket for RF section	SA:4878
Socket, to fit miniature bayonet base lamp	K377-4
Socket, for dial light (2)	J721-3
Shaft, band switch 6 7/8" long	J685-4
Shaft, for trimmer capacitor, brass 5 9/16" long	L084-2
Shaft, Bandspread pinch	SA:8106
Shaft, bandspread drive	SA:8107
Shaft, main tuning pinch	SA:8109
Shaft, main tuning drive	SA:8110
Wafer, bakelite for band switch	K752-1
Wheel, pinch (2)	K810-1

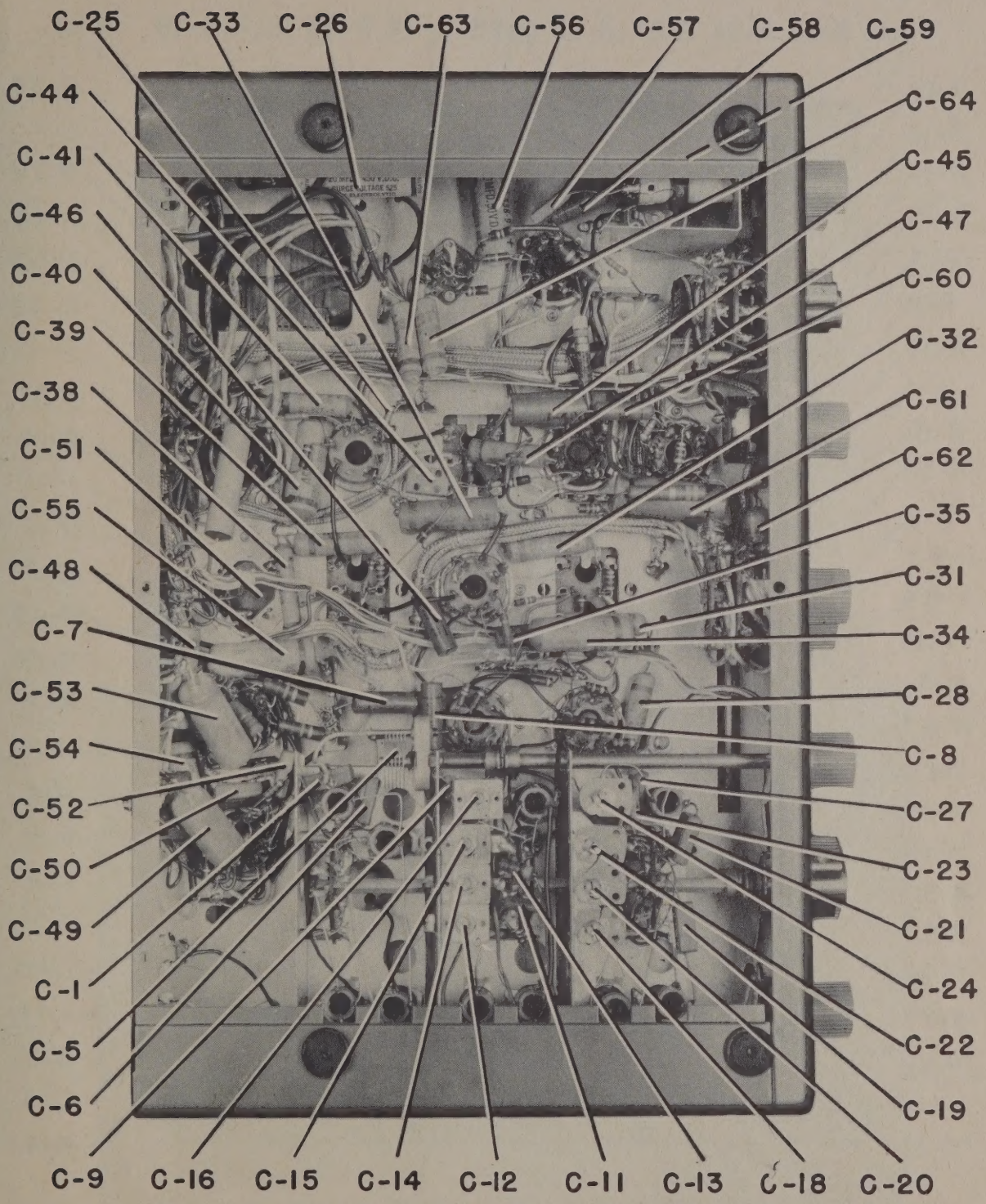


Figure No. 7. Capacitor Locations, Bottom View of Receiver

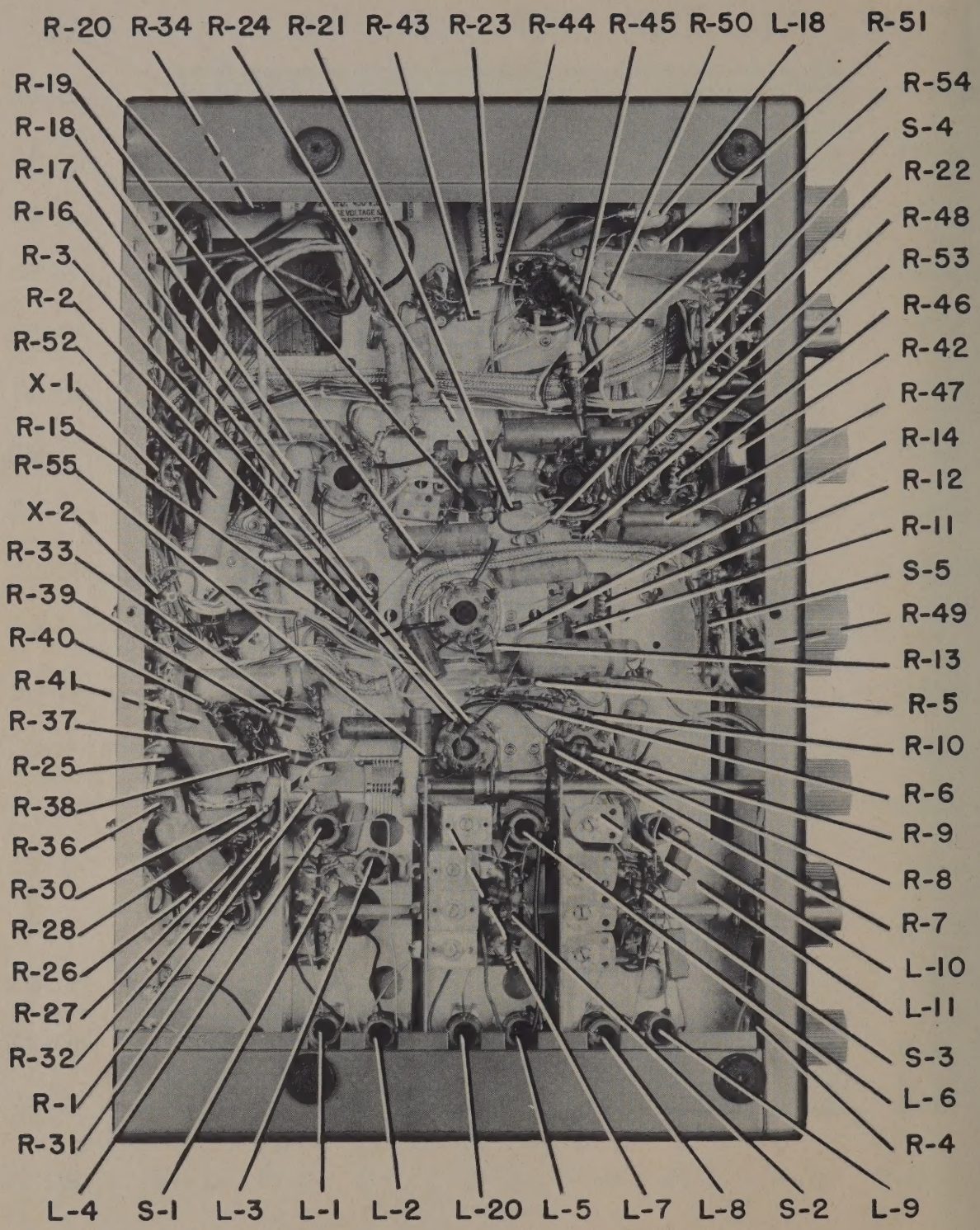


Figure No. 8. Resistor and other Component Locations, Bottom View of Receiver

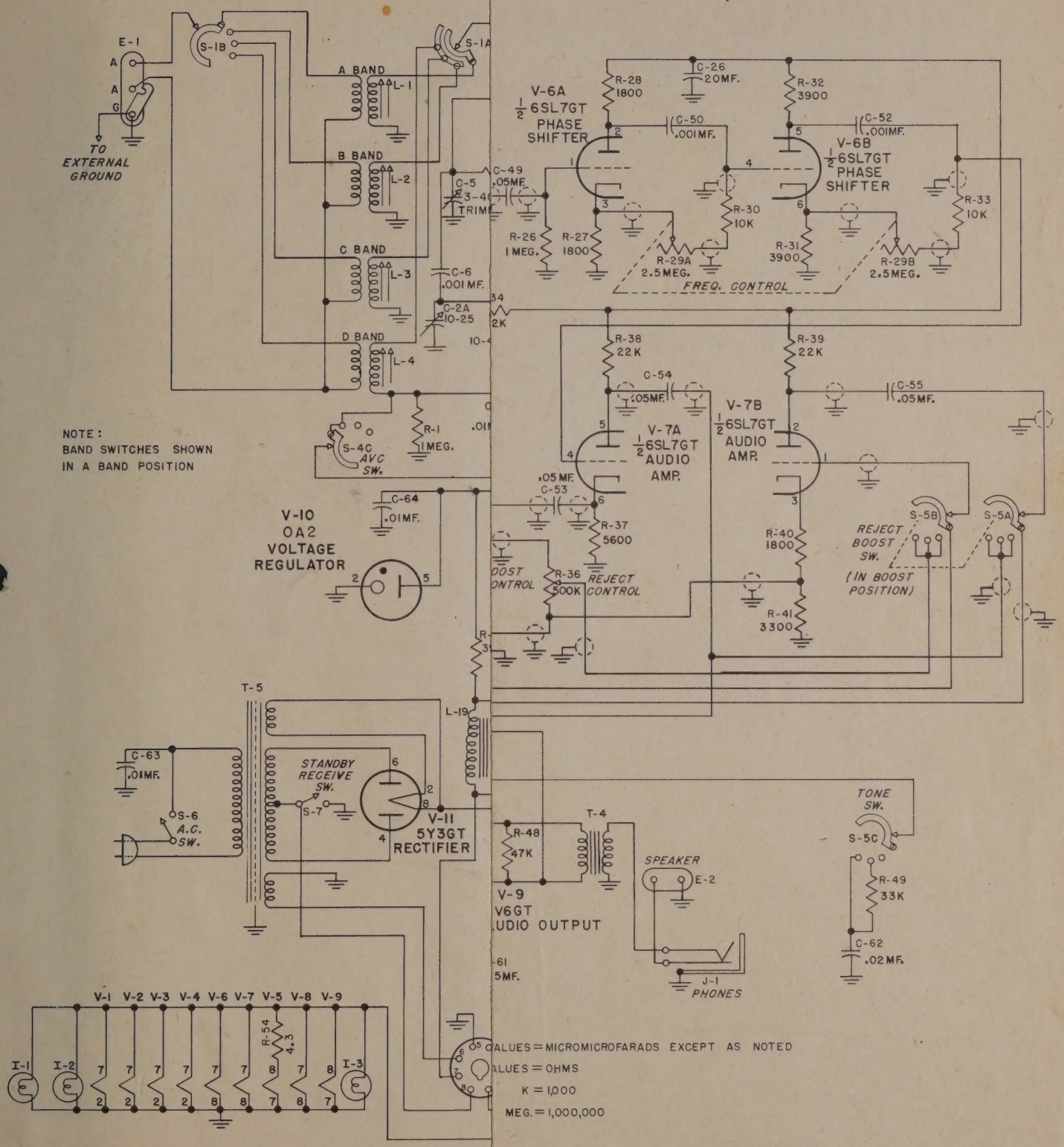


Figure No. 9. Schematic Diagram

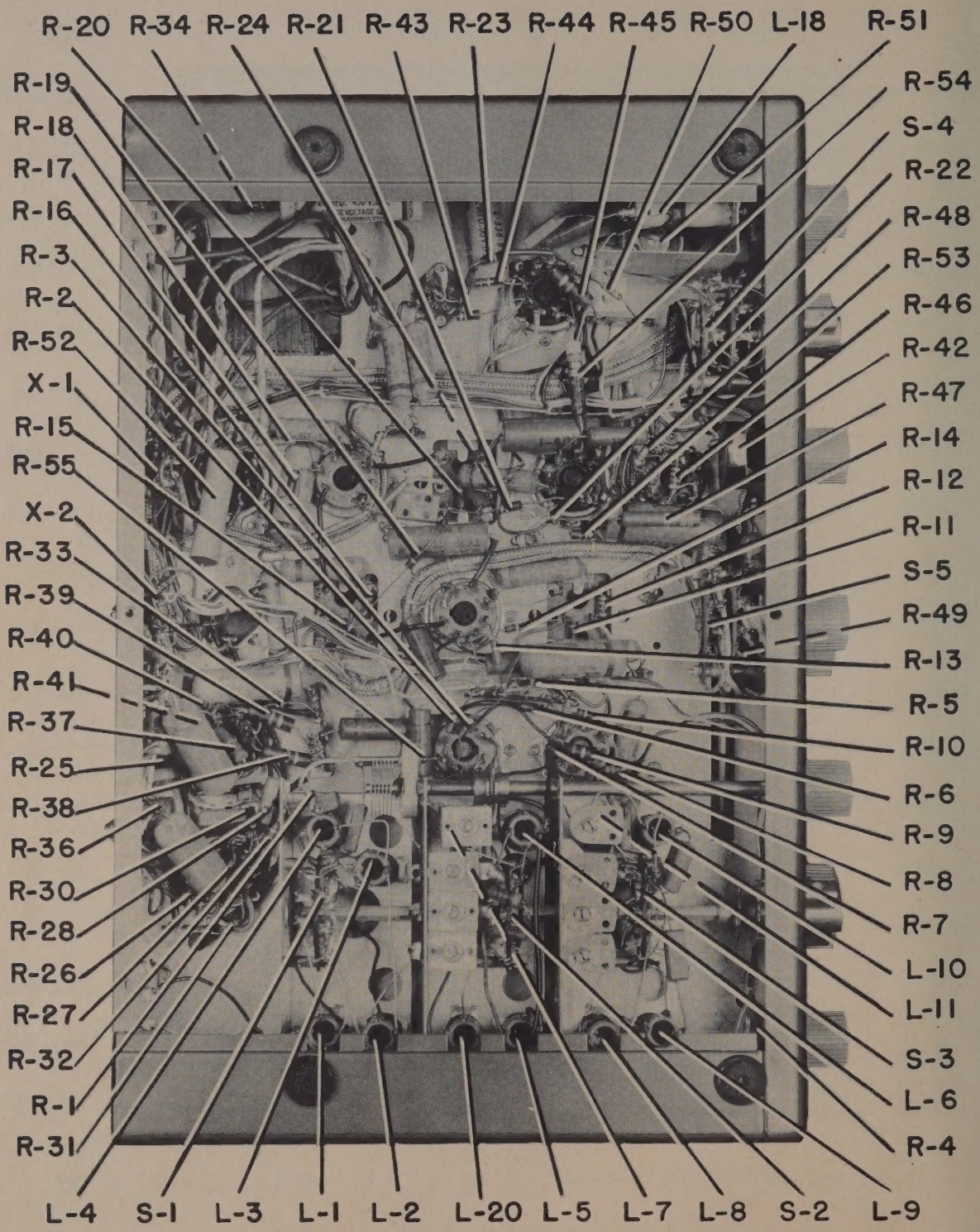
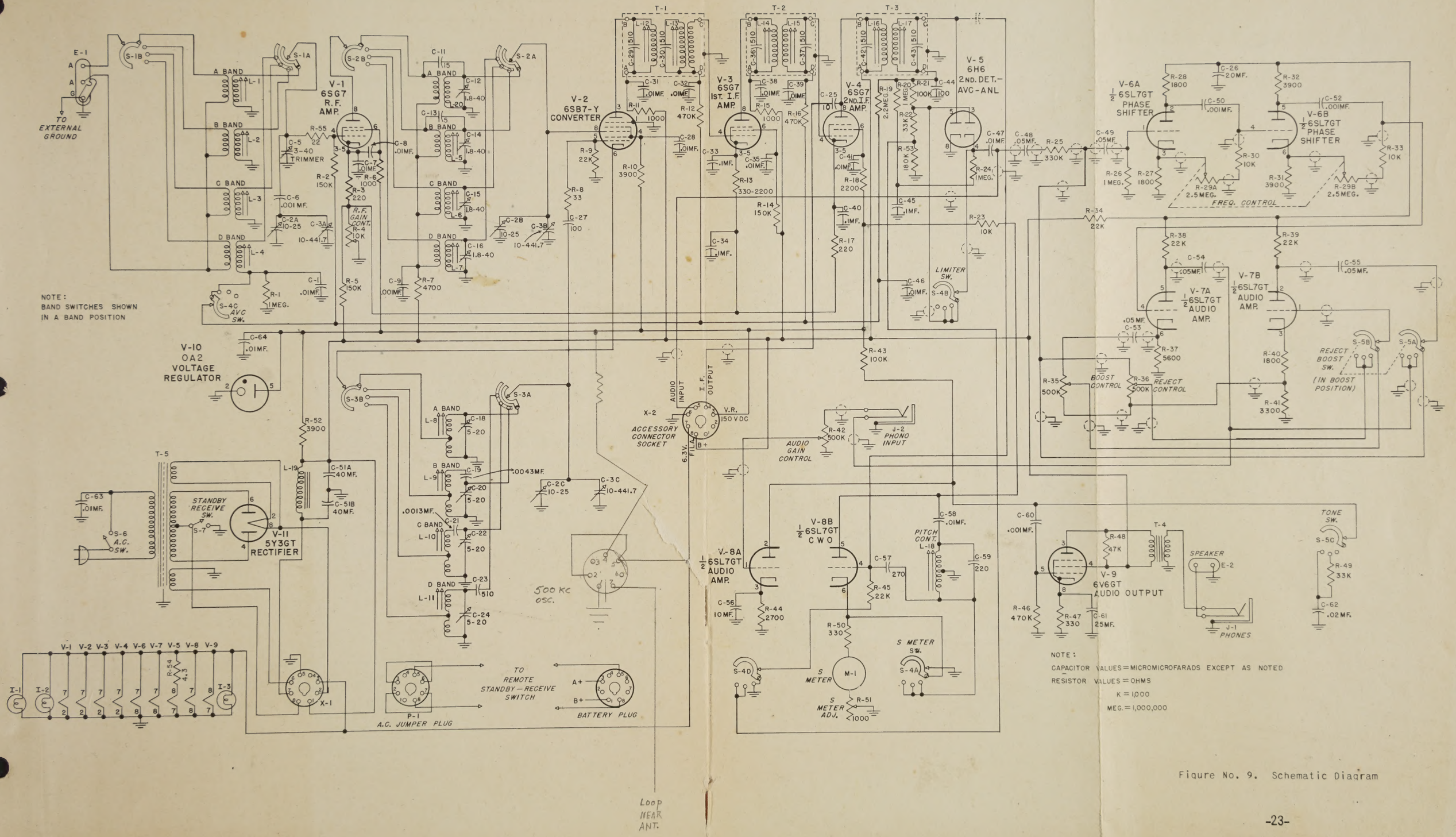


Figure No. 8. Resistor and other Component Locations, Bottom View of Receiver



NOTE:
BAND SWITCHES SHOWN IN A BAND POSITION

NOTE:
CAPACITOR VALUES = MICROMICROFARADS EXCEPT AS NOTED
RESISTOR VALUES = OHMS
K = 1,000
MEG. = 1,000,000

Figure No. 9. Schematic Diagram

Standard Form Warranty

Adopted by the Radio Manufacturers Association, Inc.

This equipment is warranted to be free from defective material and workmanship and repair or replacement will be made of any part which under normal installation, use and service discloses defect, provided the unit is delivered by the owner to the manufacturer or through the authorized radio dealer or wholesaler from whom purchased, intact, for examination, with all transportation charges prepaid to the factory, within ninety days from the date of original shipment from the factory, and provided that such examination discloses in the manufacturer's judgment that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring, improper installation, or to use in violation of instructions furnished by the manufacturer, nor extend to units which have been repaired or altered outside of the factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith of other manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for the manufacturer any other liability in connection with the sale of their radio products.

National Company, Inc. reserves the right to make any change in design or to make addition to, or improvements in, its products without imposing any obligations upon itself to install them in its products previously manufactured.

National

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MALDEN, MASS.
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